MARCH 1954

PRECISION METAL MOLDING

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DIE CASTINGS
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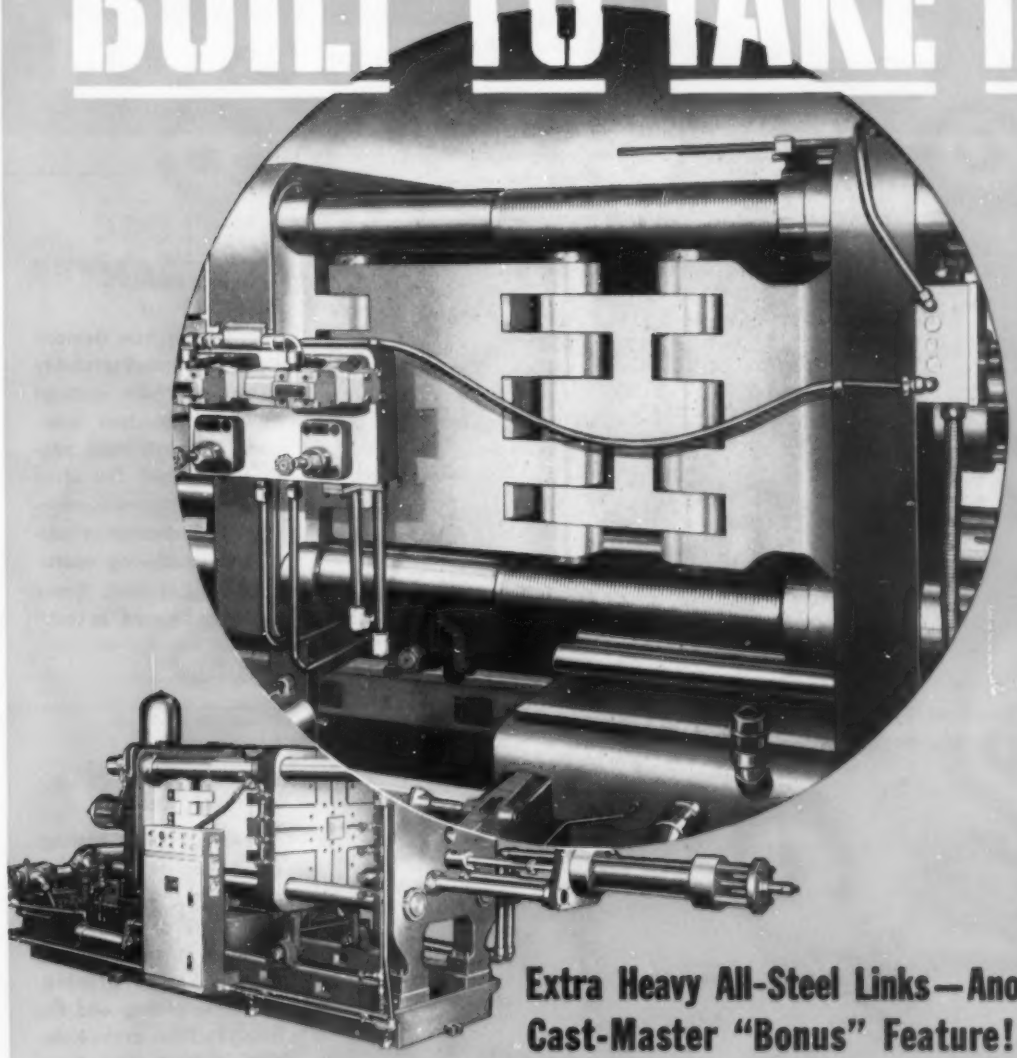

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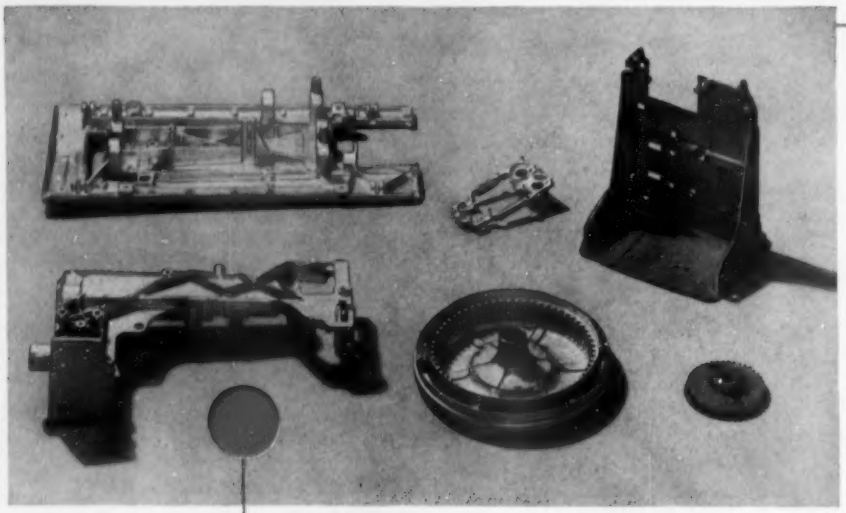

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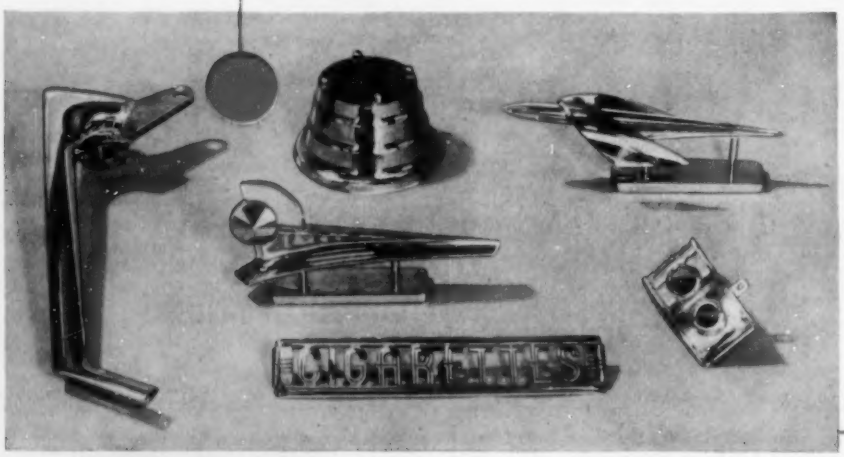
Precision has demonstrated outstanding ability to produce die castings to extremely close tolerances through rigid production control. This often results in substantial reduction or elimination of subsequent machining operations . . . in fact, many parts can be used "as cast."



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Precision die castings can be painted, oxidized, plated or self finished by polishing. Precision can finish in any manner including precious metal plating. Complete plating and finishing facilities at the Kalamazoo, Mich. and Syracuse, N. Y. plants.

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Vol. 12 No. 3

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Vice-President

STAFF

N. N. GOODMAN, JR.
General Manager

DAVID W. VEIT
Editor

PHILIP R. KALISCHER
Associate Editor

EDWIN M. JOSEPH
Circulation Director

All communications should be addressed to PRECISION METAL MOLDING, 1240 Ontario St., Cleveland 13, Ohio. Phone SUperior 1-9622.

SALES OFFICES

NEW YORK OFFICE—
LEE HAAS, Eastern District Mgr.
STEPHEN SHEPARD
ROBERT MACBETH
60 E. 42nd St.—Room 803
New York 17, New York
Murray Hill 7-3420

CLEVELAND OFFICE
ROBERT SHATTUCK
ROBERT SIMMONS
1240 Ontario St.
Cleveland 13, Ohio
SUperior 1-9622

CHICAGO OFFICE—
LLOYD WILLOUGHBY
RAY GROSS
Suite 1613-1615
520 N. Michigan Ave.
Chicago 11, Illinois
WHitehall 3-1655-56-57

LOS ANGELES OFFICE—
ALAN CAZIER
Room 1003
3460 Wilshire Blvd.
Los Angeles 5, California
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JOHN A. LANKESTER
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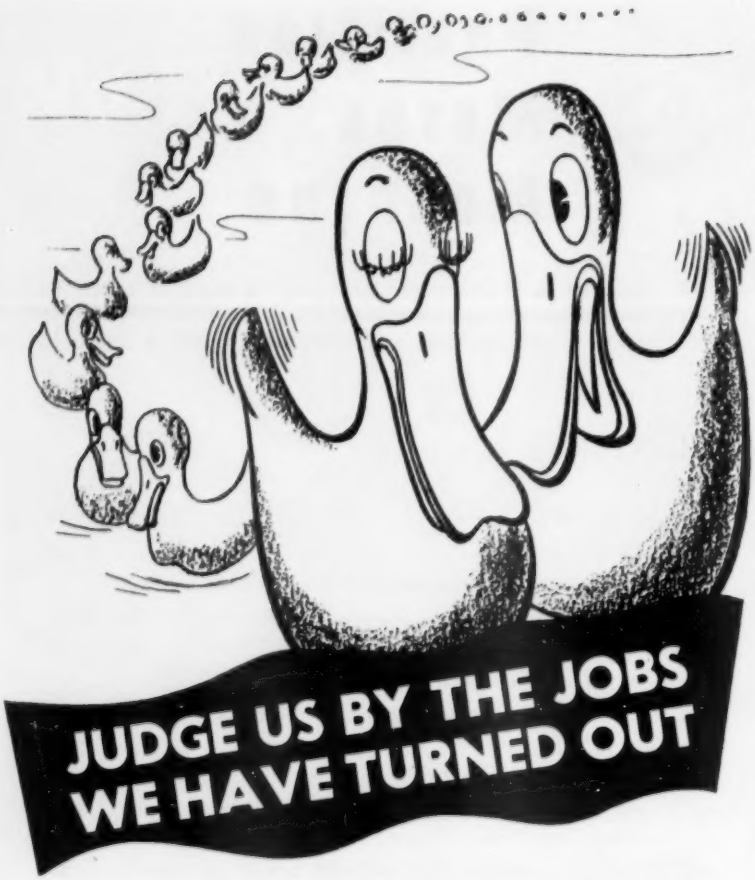

We don't like to brag about the thousands of important die casting jobs that have been entrusted to us, but . . .

. . . Our customer list looks like a "Who's Who of American Industry". We make zinc and aluminum die castings for every type of product imagineable.

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Letters to the editor

THIS IS PRECISION!

For sometime the writer has been an avid reader of your periodical, "Precision Metal Molding", with the hope of finding a process or a processor of precision castings as needed by the watch industry.

We have contacted various advertisers and subscribers in your magazine with negative results. We wish to acquire a process to produce as precision metal castings, plates similar to the two plates holding the mechanism of a watch.

These plates will not be uniform in thickness due to the various steps necessary, but will be very exact as to tolerances. Due to these steps, that is, counterbores or gutting out, the plate thickness may be .0880″ — .0870″ thru one section and ranging to a thickness of .015″ — .014″ in another.

Plates must also carry a great number of small holes (possibly 40) in sizes from .004″ diameter to .062″ diameter. Hole locations are of prime importance and are held to .0005″. This is precision.

Enclosed please find a sample plate similar to those which we are interested in processing by a cast method.

Your cooperation in assisting us in locating a process or processor to cover the above will be greatly appreciated. — E. A. N. (Buyer)

After examining the sample casting, we can sympathize with the production department that has to machine these small pieces from the solid, but we don't know of any casting or pressing method capable of yielding 40 very small holes

continued on page 6

Partial view of the aluminum die cast department of the Tri-State Die Casting Co., showing Cleveland Model 400's producing the Servel Automatic Ice Making Unit.

Servel "IceCircles" take shape...

in CLEVELAND die casting machines at Tri-State Die Casting Co.

The ice-making unit, the aluminum casting shown at left, for the unique Servel Automatic Ice-Maker Refrigerator, is produced by the Tri-State Die Casting Co., Henderson, Ky., in a battery of Cleveland Model 400 Die Casting Machines.

The high metal injection pressure obtainable with the Cleveland Model 400 assures a sound, dense casting, free of all porosity and surface defects . . . highly important in this aluminum casting as any slight imperfection could cause difficulty in dislodging the ice from the mold. *"Scrap on this job is practically nil"* is the report from Tri-State, indicating the high quality of the *hardware finish* castings delivered by the Cleveland machines.

This is another example of how the nation's leading die casters rely on Cleveland dependable performance. To get the most from *your* die casting department—in speed of production and quality of casting—investigate the advantages of the Model 400 Cleveland. Bulletin 400 gives you complete information. Write for your copy.

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FACTS ABOUT ATLANTALLOY PRECISION PLASTER MOLD CASTINGS

One-piece cast ice cutter for York Corporation's Automatic Ice Maker replaced fabrication of several stainless steel parts.

Cast brush holder for General Electric aircraft generators lowered costs, provided closer tolerances and increased strength.

Lever casting of *Atlantalloy* #31 manganese bronze with tensile strength of 100,000 psi for Sargent & Greenleaf's manipulation-proof lock.

Rugged skirt door operating mechanism cast for Pennsylvania Railroad cars manufactured by the Budd Company.

• ATLANTALLOY PRECISION PLASTER MOLD CASTINGS • ATLANTALLOY PRECISION PLASTER MOLD CASTINGS • ATLANTALLOY PRECISION PLASTER MOLD CASTINGS •

Today, ATLANTALLOY CASTINGS are used where precise dimensions and high physical values *plus* economy are essential. These unique precision plaster mold castings can improve *your* product design and reduce *your* costs:

PRECISION — Meet precision machining tolerances. Average limits, ± .005 on one side of parting line. Minimal or no machining or finishing.

DESIGN — Compared with other techniques, this casting process makes possible the production of parts which, because of high physical properties, could not economically be produced by other means. Complicated assemblies requiring several machined parts can be cast accurately as one piece, including designs having internal teeth, stops and blind gear teeth. A wide range of *Atlantalloys* are available for your design needs. Chemical certification on request.

EXCLUSIVE CASTING FEATURES — No gas formation when metal enters mold, and no ebullition of liquid metal. Self-venting molds yield to metal, cool slowly. Castings are practically stress-free with superior grain structure. Loose cores permit "impossible" designs. Finishes are exceptionally smooth and clean.

ECONOMY — Major savings in machine work because of high finish, uniformity and accuracy. End costs below machined parts from rougher-type castings, *even for limited volume runs.* Greater savings for large runs. Time and material savings since uniform castings always fit your jigs and fixtures without rejects. Tool life extended because castings have no blow holes, hard spots, or inclusions.

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Middle Atlantic States — Beemer Engineering Co., 401 North Broad St., Philadelphia 8, Pa.

New England — J. C. Tarbel Associates, Inc., 64 Park St., Springfield 2, Mass.

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continued from page 4

located to .0005 in a piece whose outside dimensions are about 1" x ¾". However, we invite any of our readers to make an offer. — Ed.

POWDERED IRON PISTON RINGS

In your January issue of Precision Metal Molding, there was a paragraph which referred to a coming article on Powdered Metal Piston Rings as manufactured by a German source. Will you kindly advise the name of the manufacturer, as we are very much interested in obtaining information concerning a similar requirement, and samples of their product. —R. E. M.

There have been strong indications of vital interest in this project on the part of American manufacturers. Several piston ring producers are believed to have done some work along these lines, although at the present time, no information is available.

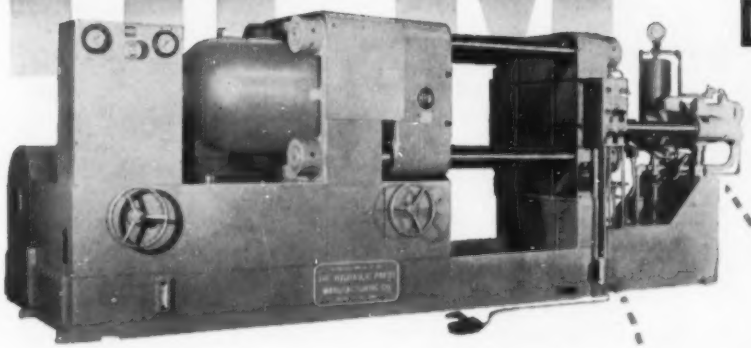
Nevertheless, we have sent copies of the article which appeared in PMM in February, and sources from which further data may be obtained. — Ed.

ELECTROFORMING

We note that you have published an article on designing of electroformed parts entitled "What Electroforming Offers the Designer of Precision Parts". This was published in March of 1952 and we wonder if tear sheets of this article are available. — H. P.

Tear sheets have been sent. It is an interesting coincidence that in the Finishing Section of the current issue of PMM, is another article pointing out one way in which electroforming is now being used . . . to produce a new type of microfinish comparator. — Ed.

HPM



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with Built-In Nitrogen Accumulator for INCREASED INJECTION SPEED!

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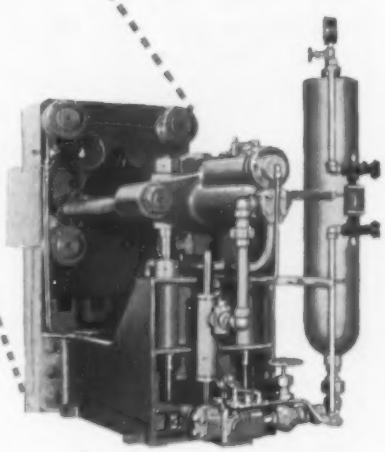
- Here's a new, high-speed die casting machine for making aluminum castings up to 12 lbs. in weight. Listed below are just a few of the H-P-M design features which make this new die caster second to none:
- High-speed plunger advance . . . up to 400 ft. per minute.
- Positive, injection pressure build-up . . . no pre-fill valve to close.
- Built-in hydraulic ejector saves time, greatly reduces die costs and minimizes operator fatigue.
- Rugged straight-line "All-Hydraulic" die clamp with few moving parts, assure positive die alignment . . . die change-over is simple and fast.
- Dual hydro-electric safety devices guard against premature injection.
- Plenty of space around die mounting surfaces for installation of core pull cylinders.
- Independent handwheel adjustments for both die clamp and injection pressures.



400 ft. per Minute *Injection Speed*

Write for catalog 5106-A, today.

SPECIFICATIONS MODEL 400-B					
SIZE OF DIE PLATES	SPACE BETWEEN BARS	DIE OPENS	MAXIMUM DIE SPACE	CAPACITY PER SHOT (LBS.)	NET WT. (LBS.)
38"x38"	23"x23"	16"	42"	2.2 To 12.2 (Al)*	40,500

*Note: The model 400-B handles brass and magnesium die casting as well. Complete specifications on this and model 150-A (150-Ton) machines on request.

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Jersey Plastic & Die Casting Company has been in the business many years; we're proud of our long list of customers who keep coming back because they like the work we do. We invite you to investigate our plant, look at some of the thousands of different castings we have produced, and give us a chance to quote on your castings. Our engineers will gladly advise you on any technical problems you may have with your die casting designs.

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Between the Lines of this and future issues

Designed To Be Destroyed . . . ?

Most products are designed for maximum durability; we plate, paint, chemical treat or otherwise shield many types of products to squeeze the last minute of serviceability from them. But what about designing a product for calculated self-destruction? Some pointers on designing "sacrificial" magnesium anodes are given beginning on page 48.

If You Have Ever Produced Military Components . . .

You will find a sympathetic note in a case history on a Signal Corps component produced by a small Eastern die caster. Some of the headaches relating to specs, testing and procurement are set forth in an article that starts on page 41. Incidentally, it represents the sort of contribution being made by the commercial die casting industry in meeting our defense needs.

Answers to Questions on Powder Metallurgy . . .

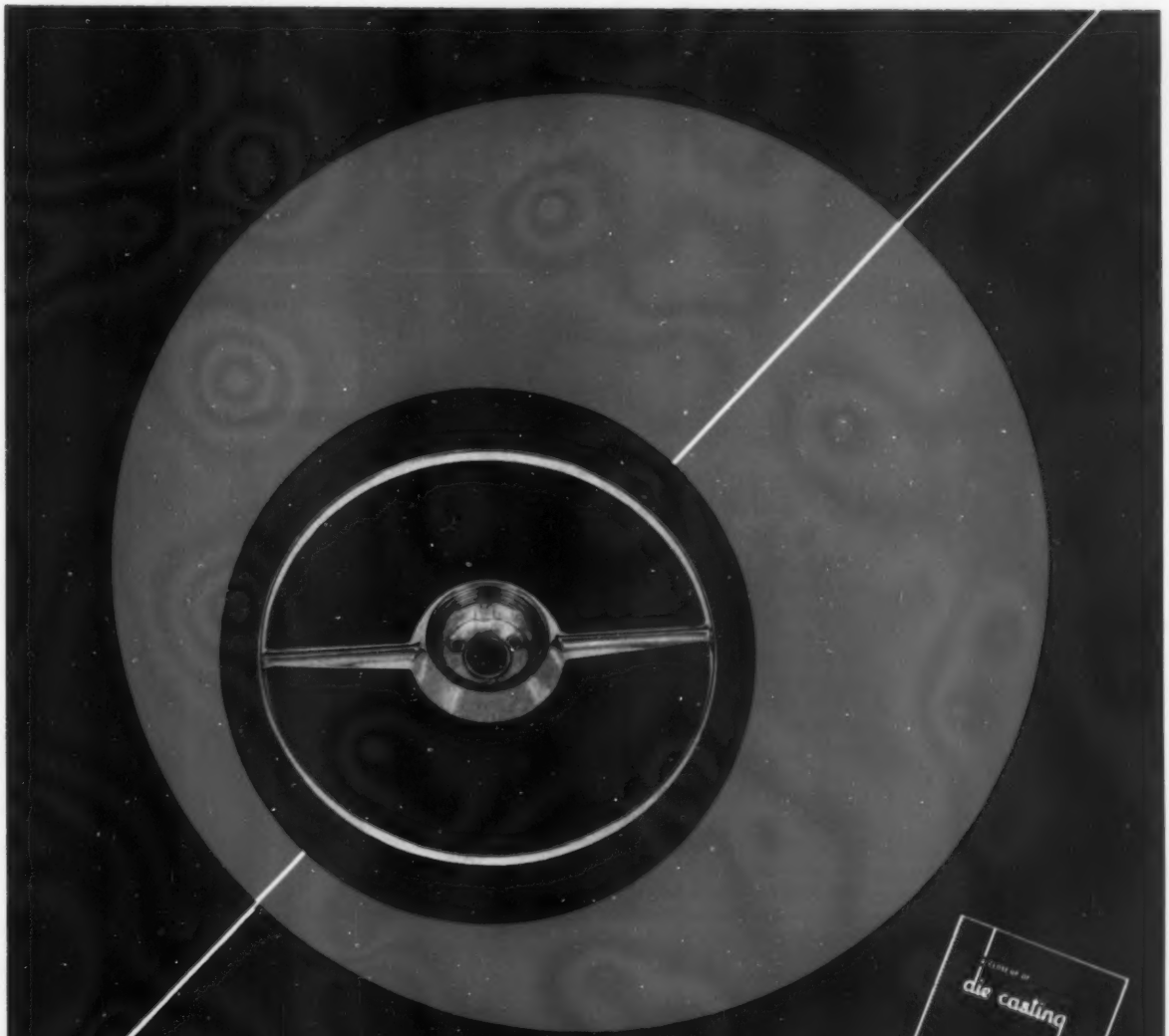
Those interested in powder metallurgy, either as designers, buyers, or producers of parts will not want to miss the special April issue of PMM that will have our third annual Directory of Powder Metallurgy, a brand new technical data section, and a series of specially-written articles on major phases of powder metallurgy. It's bound to answer many of your questions on how to design, where to buy, etc.

How Smooth Is a Surface . . . ?

This is not another of those unanswerable questions like "How high is up ?" . . . No, there is a good answer to this question now that someone has made a precision tool for determining degree of surface roughness. Designers, buyers, machinists and inspectors can be sure they are talking the same language now when they give an rms spec. See page 63.

Shell Mold Explained . . .

There are many misconceptions about what shell mold casting is and what can be done by it. An Eastern shell mold foundry has set out to explain the answers to its customers in a series of letters. The editors of PMM have found them so interesting we are going to present them starting in May.



* Automotive parts? Yes, two out of every three cars produced today in the low-priced field carry die castings by Pressure!

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For Aluminum Die Casting

The NEW LESTER-PHOENIX HP-1-C

DIE MAKER'S PRECISION

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The shot cylinder and cold chamber are accurately supported in perfect alignment in either of two shot positions. There is no binding of the shot plunger and full pressure is delivered to the die. The solid frame is likewise finished to within .0005" with die maker's precision. And, for maximum use, the new HP-1-C is convertible to the famous Self-aligning Zinc End.

These are the highlights of the new HP-1-C. The representative listed below in your area will be happy to explain all the features of this and other Lester-Phoenix Die Casting Machines.

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USCO Z-3 Z-5

USCO Z-3 is an aluminum-magnesium hardener for the production of Zamac 3 alloy, and USCO Z-5 is an aluminum-magnesium-copper hardener for the production of Zamac 5 alloy.

USCO Z-3 is used in the ratio of 1 part to 24 parts of 99.99% plus slab zinc to produce Zamac 3 alloy. USCO Z-5 should be mixed 1 part to 19 parts of zinc to make Zamac 5.

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Most Zamac in the United States today is produced by adding hardeners such as USCO Z-3 and USCO Z-5. If you have never used USCO Z-3 or USCO Z-5 or alloyed your own Zamac, we ask you to investigate the possibilities with us.

Free...*Send for our detailed pamphlet "USCO Z-3 and USCO Z-5 Hardeners"*

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2. We submit a detailed proposal for your review and consideration.
3. We prepare an installation layout if one is needed.
4. We design, manufacture, and supply the basic machinery, tools and dies, conveyors, loading mechanisms, furnaces, or any other related auxiliaries.
5. Our field force installs or supervises the installation of the complete equipment in your plant.
6. We place the equipment in operation and train your supervisory and production personnel.
7. We assume responsibility for the satisfactory performance of the equipment as an integrated plant.

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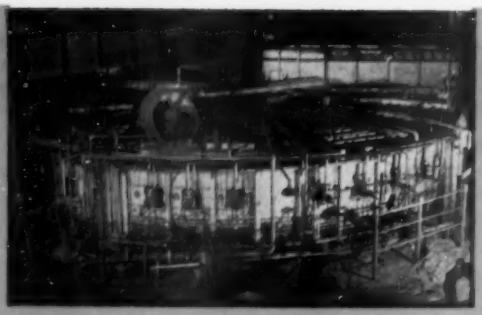
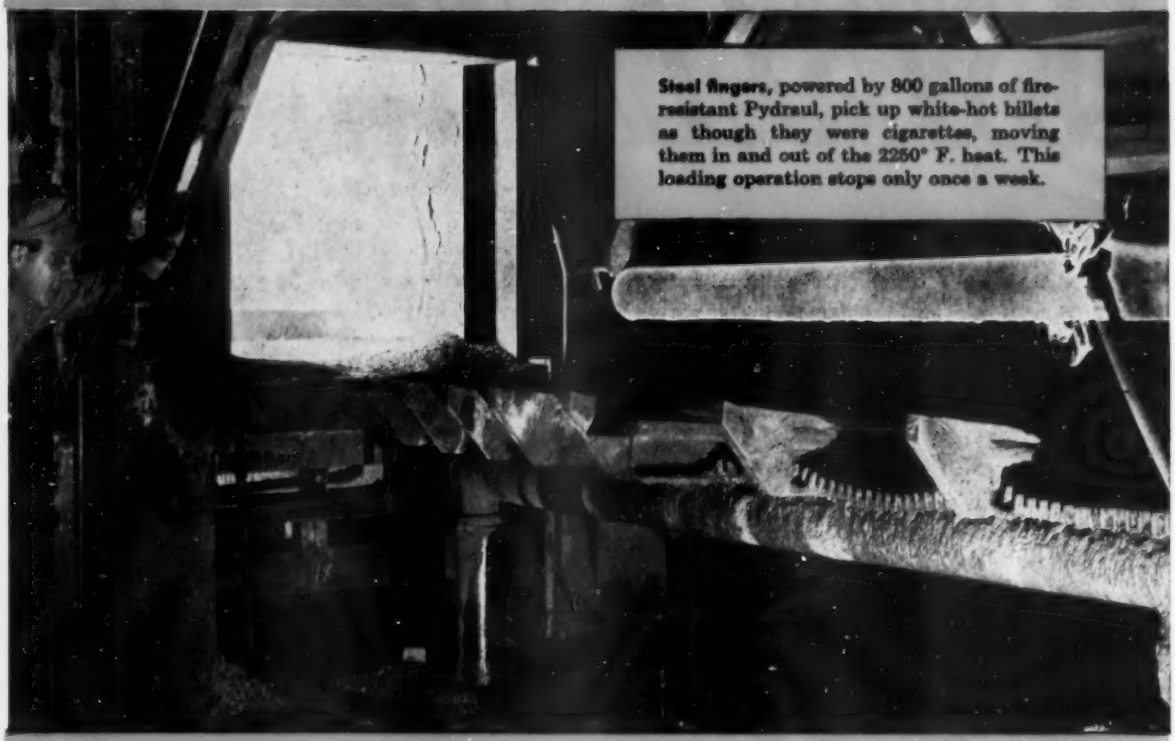
LAKE ERIE®

For additional information Circle No. 47 on the Reader Service Card



One line break with flammable fluid, causing a costly shutdown, moved Spang-Chalfant to switch to Monsanto Pydraul. Long-lasting and noncorrosive, Pydraul reduces make-up rates by as much as 80%.



Steel fingers, powered by 800 gallons of fire-resistant Pydraul, pick up white-hot billets as though they were cigarettes, moving them in and out of the 2250° F. heat. This loading operation stops only once a week.

PYDRAUL STOPS FIRES BEFORE THEY START

Monsanto Hydraulic Fluid Helps Steel Furnace Operate 160 Hours a Week

OPERATING CONTINUOUSLY to keep up with production schedules, this Hagan Rotary furnace at the Spang-Chalfant plant of The National Supply Company is equipped with a hydraulic loading boom actuated by fire-resistant Pydraul F-9.

BEFORE PYDRAUL F-9 was adopted, a line containing flammable fluid broke—shutting the furnace down for six hours. In addition to damage to electrical connections, the downtime was expensive in terms of lost production.

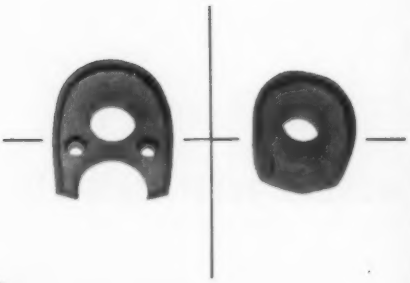
AFTER PYDRAUL WAS INTRODUCED, one incident demonstrated dramatically its fire-resistant properties. A ruptured hose connection sprayed Pydraul over hot billets and into the furnace door. This time, however, there was no damage to equipment or injury to personnel. Only a minimum of production time was lost while the hydraulic system was refilled.

Pydraul: Reg. U. S. Pat. Off.

Ask us for this booklet on Pydraul. Write Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478, St. Louis 1, Missouri.

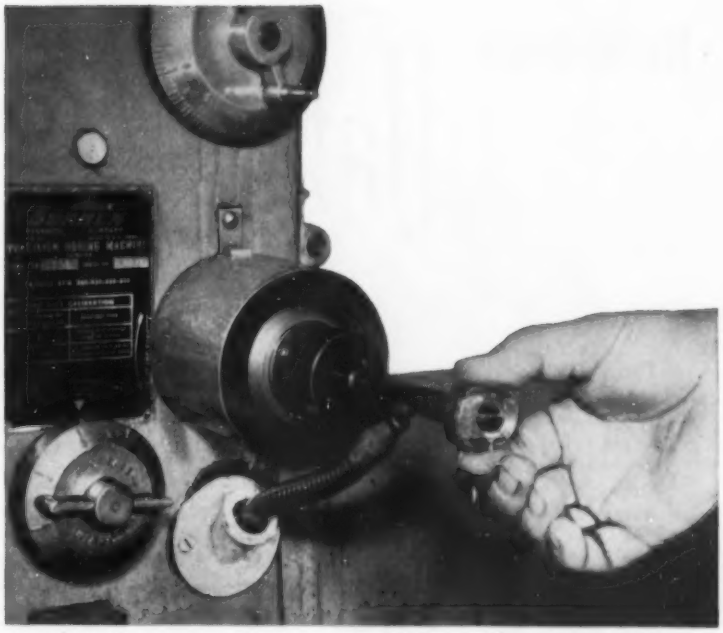
MONSANTO
CHEMICALS—PLASTICS

For additional information Circle No. 33 on the Reader Service Card



How Inco Precision Casting Cuts Production Cost

37%



Lapping inside diameter of Winchester jig cap. Inco precision casting cut production cost on both this small part and jig tip (upper left) by eliminating forging, broaching and most machining previously needed to make the parts.

Up at Winchester Repeating Arms Co., they used to forge the jig cap and tip from mild steel bar stock.

But they don't any more — the cost for forging, broaching and machining ran too high. Winchester engineers felt that better and less expensive parts could be made.

Precision investment casting seemed to be the answer. In their own pilot precision casting plant, Winchester engineers found that casting promised to reduce production time and make possible the use of a harder alloy.

So, they called in Inco to put the job on a production basis.

Inco casting specialists cast the parts in 18-4-1 high speed steel. Now, Winchester's production has speeded up sharply because these Inco precision castings eliminate all forging, broaching and machining operations except lapping, grinding and drilling two holes.

This makes possible an estimated cut in cost of more than 37%. And what's more, the parts give approximately three times longer service life.

To See How Others Cut Costs

Write for a free copy of "A Machinist's Nightmare Becomes a Designer's Dream."

Can You Cut Costs with Inco Precision Castings?

Whenever you have a part which is 6 inches x 5 inches or smaller, weighs under 3 lbs., requires starting tolerances as close as plus or minus .005 inch per linear inch, and needs 5 or more fabrication steps, there's a good chance you can save by having it precision cast.

What Alloys Can Be Precision Cast?

You may obtain precision castings from Inco in practically any metal from plain carbon steel to the new super alloys. And no matter what metal you specify, you get many advantages.

5 Advantages of Inco Precision Castings

Lower fabricating costs
Wider design latitude
Higher alloys at lower cost
Longer life with harder alloys
Eliminates all or most machining

THE INTERNATIONAL NICKEL CO., INC.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK **Inco Castings** *Precision, Sand, Centrifugal*

For additional information Circle No. 41 on the Reader Service Card

Reference Data offered in this month's advertisements

4. THE ALUMINUM SMELTING industry, what is it and what does it produce? A reprint of a detailed study of the aluminum smelting industry is available from the Aluminum Smelters Research Institute.

5. DRY FILM DIE LUBES — their advantages in the die casting of zinc and aluminum are discussed in a bulletin from Acheson Colloids.

8. PLASTER MOLD CASTINGS, their design, application and advantages are given in a brochure published by the Atlantic Casting & Engineering Co.

9. REFERENCE DATA on investment castings has been prepared for designers and buyers by Arwood Precision Casting Corp.

15. TAILOR MADE MELTING STOCK specifically for the investment casting industry is described and many alloy properties given in a booklet put out by Cannon-Muskegon.

17. TECHNICAL DATA SHEETS on non-flammable hydraulic fluid are included in a brochure, "Lindol HF," available from the Celanese Corp.

18. NON-FLAMMABLE hydraulic fluids for die casting machines are described in a brochure from Union Carbon & Carbide Corp., giving full data on their UCON Hydrolubes.

20. DIE CASTING MACHINES are described and pertinent data given in bulletin No. 400 of Cleveland Automatic Machine Co.

26. SMALL DIE CASTINGS-the advantages of the die casting process for making small parts in large quantities-are given in a booklet from the Dollin Corp.

34. SMALLNESS UNLIMITED is the title of a booklet available from the Gries Reproducer Co. describing their facilities for making tiny zinc die castings.

35. THE HENNING MESSENGER, official house organ of Henning Bros. & Smith gives current news of interest to die casters and foundrymen.

36. HOW TO DESIGN and use investment castings is the subject of a brochure available from the Hitchiner Mfg. Co.

38. DIE CASTING FILE folder is available from the Hoover Co., giving design and application data on die castings.

41. DESIGN AND MACHINING bottlenecks can be overcome through the use of investment castings. A booklet from International Nickel Co. details some of their many uses.

43. DIE CASTING facilities of the Jersey Plastic & Die Casting Co. are described and illustrated in a brochure.

46. DIE CASTING MACHINES of all sizes are listed and described, and engineering data given in the Kux Machine Co. catalog.

49. THE LESTER PRESS, published by the Lester-Phoenix Co. gives information about new die casting machines and production tips on die casting.

50. DESIGNING DIE CASTINGS, an informative bulletin on aluminum and magnesium die castings, is available from Litemetal Dicast.

51. NEW DIE CASTING MACHINES are described in a bulletin from Lewis Welding & Engineering.

54. PHYSICAL & METALLURGICAL properties of compacts made with pre-alloyed chromium-nickel powder mixed with iron powder are given in a bulletin from Metal Hydrides Co.

55. SEALING OF POROUS CASTINGS can be easily and economically done according to literature available from the Metallizing Co. of America.

60. DIMENSIONING DIE CASTINGS, a booklet published by the Newton-New Haven Co., gives basic design and engineering information.

61. WHERE PLASTER MOLD castings are used is demonstrated by a series of case histories in a brochure distributed by Ohio Precision Castings, Inc.

67. DIE CASTING applications and the facilities of the Racine Die Casting Co. are included in a brochure.

70. STAINLESS STEEL LADLES for handling molten metal are described and the complete line listed in the Spincraft catalog.

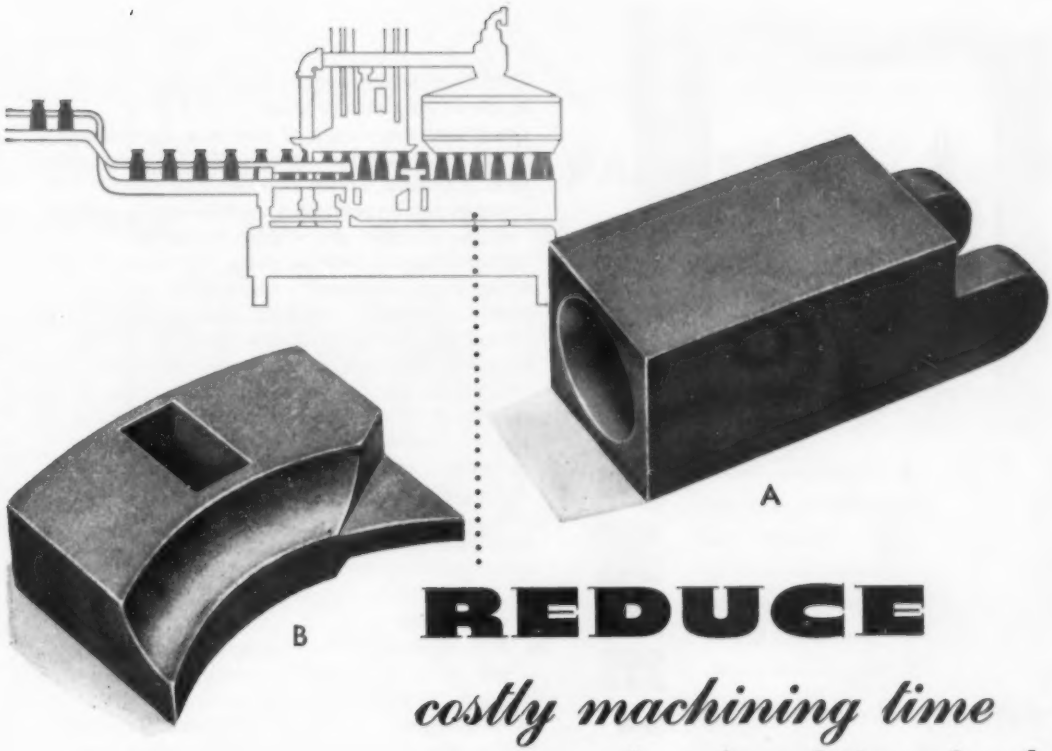
73. CREATIVE CASTINGS is the title of a booklet on light metal castings put out by the Light Metals Div. of Thompson Products, Inc.

77. FREE MACHINING STEELS for tools and dies are described, and their properties given, in data sheets availabble from the Vanadium Alloys Steel Co.

79. BARREL FINISHING by the Abbott method is described in literature published by the Abbott Ball Co.

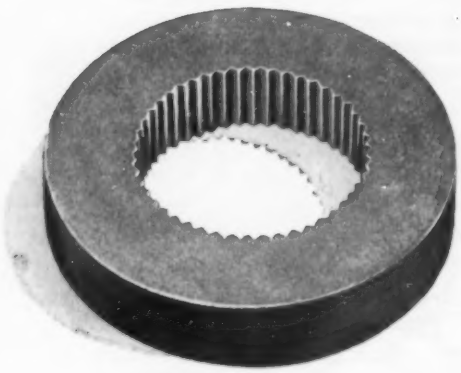
80. CORROSION RESISTANCE of metal parts is greatly enhanced through the use of Iridite, as reported in literature from Allied Research Products Co.

continued on page 94



REDUCE

costly machining time and extend product life



C

with Crucible ACCUMET Precision Investment Castings

Where parts are intricate or machining difficult, substantial savings can be made by using Crucible Accumet Precision Investment Castings.

The Type 303 Stainless castings shown above (A & B), for example, eliminated practically all expensive machining operations for a manufacturer of milk bottling machinery.

In many cases life of component parts can be greatly extended by using castings of high-alloy grades impractical to machine. The ring illustrated (casting C), used in a fine wire feed mill, is an investment casting made of Crucible *Rexalloy*, a non-ferrous cobalt-chromium-tungsten alloy steel providing exceptional wear and abrasion resistance.

Crucible engineers and metallurgists are available to help you solve design problems or lower production costs with Accumet Precision Investment Castings. Write now for further information.

CRUCIBLE first name in special purpose steels

54 *years of* Fine *steelmaking*

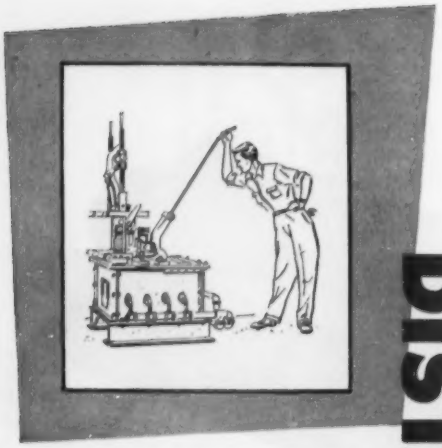
ACCUMET PRECISION CASTINGS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MAX-EL MACHINERY • SPECIAL PURPOSE STEELS

For additional information Circle No. 22 on the Reader Service Card

DISTANCE: 200 LBS.



↑ The first practical die casting machine, some fifty years old, now in the Smithsonian Institute, Washington. Weight of its castings was limited to about four ounces.

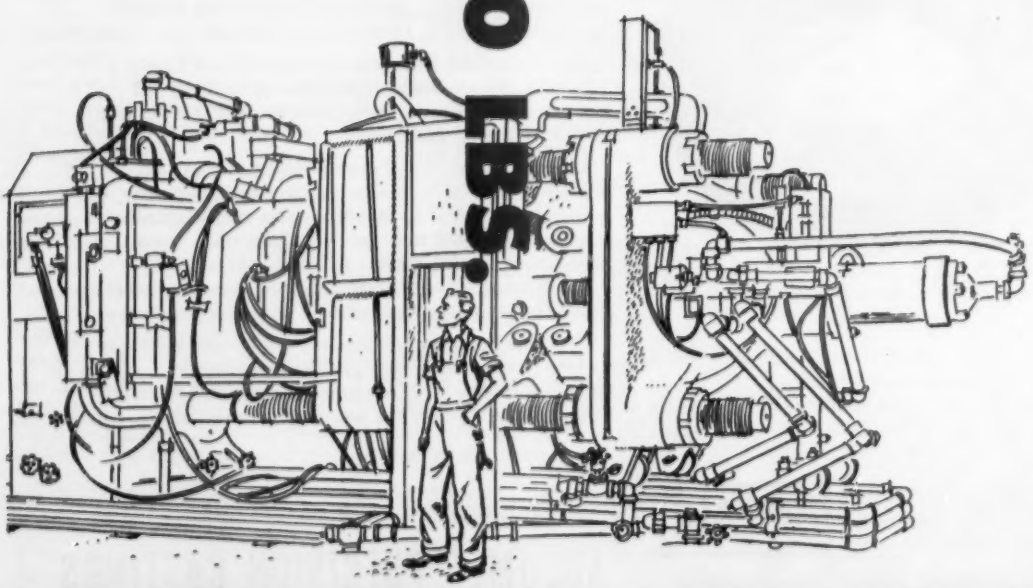
Illustrations courtesy Doehler-Jarvis Corp.

Die castings weighing up to two hundred pounds in zinc can be produced from this modern die casting machine. ↓

ONE WAY OF MEASURING the fabulous advance of die casting as a production tool is by comparing the weight of zinc base die castings produced – then and now. In 1907 it was limited to four ounces. Today two hundred pound castings can be produced, *and the end is not yet!*

Since die casting is a process for the manufacture of metallic parts, two branches of technology, mechanical engineering and metallurgy, early joined hands and successfully turned die casting problems into die casting progress. Mechanical engineering has been responsible for the physical development of the process as related to the casting mechanism and the design and construction of dies, tools and other necessary equipment. Metallurgy developed suitable casting alloys and ferrous die materials. It has been responsible for the development of electroplating, painting and other finishing methods as well as the study of all factors concerned with the production of sound castings.

Any attempt to determine which one of these two branches of technology has contributed most to the phenomenal growth of the die casting industry would be irrelevant. Each has had to rely upon the other; neither could have proceeded alone. As a result of their joint efforts, one of the fastest and most practical low-cost production tools has been made available to the country's vast metal-working industries.

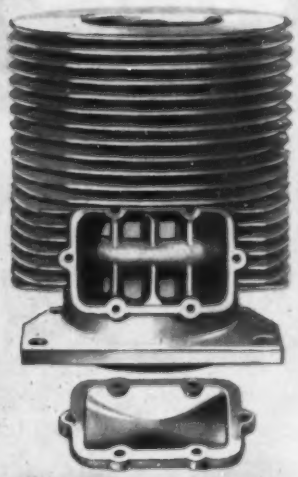


EASTERN SALES AGENTS ST. JOSEPH LEAD COMPANY 250 PARK AVENUE, NEW YORK 17

BUNKER HILL 99.99+% ZINC

SALES OFFICE FOR PACIFIC COAST NORTHWEST LEAD COMPANY SEATTLE, WASHINGTON

Lightweight, Strong PARKER Die Castings Reduce Costs on POULAN CHAIN SAW!



THE versatile, rugged Poulan Chain Saw is a boon to woodsmen everywhere. Its portability and ease of handling have made it a profitable piece of equipment to those engaged in the lumbering industry. Lightweight, strong die castings by Parker serve to lighten the load of the operator. The die cast engine cylinder and cover have helped reduce production costs since machining of the die cast part is eliminated. The die cast fins on the cylinder wall are strong and clean, diffusing heat evenly. This is another of the hundreds of instances where Parker Die Castings have lowered costs for manufacturers in nearly every industry. Parker Die Castings are lightweight, strong and clean. Machining is virtually eliminated. Consult with Parker on your next die casting requirements.

and when you think of Die Castings THINK OF

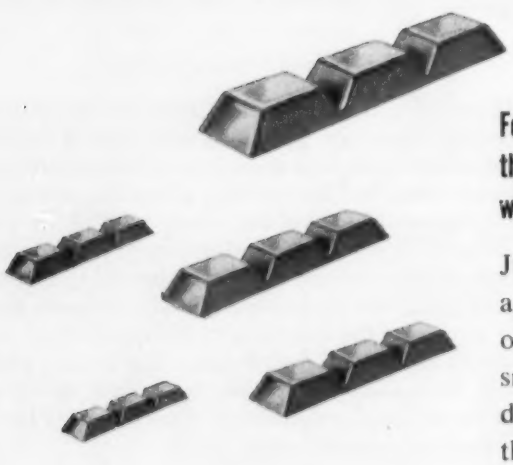
Parker White-Metal Company • 2153 McKinley Ave., Erie, Pa.

PARKER ALUMINUM *and* ZINC *Die Castings*

For additional information Circle No. 64 on the Reader Service Card

80% of our business is your business!

KEEPING YOU IN THE ALUMINUM



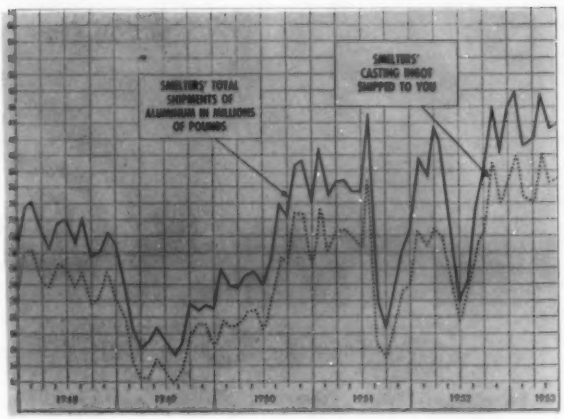
Foundrymen, die casters, and aluminum smelters built their industries together. As shown in the chart, you will see that 80% of our business is your business.

Just as it is good business for you to care for and protect the customers who provide 80% of your business, you know that aluminum smelters will protect your interests. They produce the specialized casting alloys you need—they deliver on time, all the time—and if technical assistance is required, they have experts in your plant promptly.

This chart, based on Bureau of Mines data, shows total shipments of aluminum smelters

no foundry ever shut down because

BUSINESS IS SMELTERS' JOB!



and smelters' shipments of casting alloys. Note that shipments of smelters casting ingot consistently represent 80% of the smelters' business year after year. These shipments of casting ingots go hand in hand with the needs of foundrymen and die casters. We are proud that *no foundry or die casting plant ever shut down because he couldn't get aluminum ingot from smelters.*

Your aluminum smelter supplies you with the specialized casting alloys you need, tailored to your requirements—in small or large quantities as you need them. His production facilities are your guarantee against high inventories and costly work stoppages.

An interesting article on the Aluminum Smelting Industry and its history appeared in the November issue of "Modern Metals". It's a question and answer article that tells many of the answers to questions bearing on your supply problems. Write for your copy today.

ingot was not available from smelters!

ASR

Aluminum Smelters Research Institute
20 North Wacker Drive, Chicago 6, Illinois

For additional information Circle No. 4 on the Reader Service Card

DOLLIN Zinc & Aluminum DIE-CASTINGS

To cut piece costs . . . improve quality . reduce machining and assembly operations—check with Dollin. Many leading manufacturers have found that we can provide the highest quality die-castings at the lowest cost. Reason: 23 years of *specialized* experience . . . plus *specialized* equipment, much of it Dollin-designed:

LARGE CASTINGS—Aluminum castings made on large cold chamber type, high pressure machines. Large zinc castings made on large plunger type machines.

SMALL ZINC CASTINGS—1000 per lb. to 3 per lb.—made on *fully-automatic* machines. More design latitude than other high-speed methods—attractive tool costs and piece prices.

SEND PRINTS OR SAMPLES FOR QUOTATION—engineering advice at no obligation. General Facilities and Small Parts bulletins on request.

DOLLIN CORPORATION, 614 So. 21st Street, Irvington 11, N. J.
Sales Offices: Boston • Buffalo • Canton • Charlotte • Chicago
Detroit • Philadelphia • Pittsburgh • St. Louis • Chicago • St. Paul

For additional information Circle No. 26 on the Reader Service Card

Names and Trends in Markets · Materials · Applications

ONE OF THE PIONEER die casting companies in the East has moved. Established in the early years of the century as the C. J. Woberg Die Casting Company, it was then bought out by a far-sighted group of young tool and die makers from Toledo who had pooled their resources. These men, led by Gustav Nyselius and Nathan Lester, changed the firm's name to the Mt. Vernon Die Casting Company and proceeded to grow with the industry. Now, nearing their 50th anniversary, and still led by Gus Nyselius, the company has built itself a new, modern and much larger plant in Stamford, Conn.

DO BASEBALL PLAYERS make good salesmen? Facts show they do. Newest sales "rookie" is Eddie Sawyer, former manager of the Phillies, who is doing a good job representing Litemetal Dicast in the Philadelphia area. A couple of other big leaguers who have built reputations in the die casting industry are Clint Brown, erstwhile Cleveland Indian, who represents Aluminum Smelting & Refining Company and Certified Alloys Company; and Roger Peckinpaugh, also an ex-big leaguer who has his own agency representing manufacturers.

A BOOM in the aluminum fabricating industry in Florida has been reported. Due to the salt air, humidity and other climatic conditions, a specialized market for aluminum products has developed there. Current figures show 19 die casters in the Miami area, alone.

SECOND LARGEST CONSUMER of zinc in the United States is the die casting industry which has just finished a peak year, producing about 300,000 tons of zinc die castings . . . an increase of 28 percent over 1952. What will happen to this figure in 1954, in view of an expected decline of 10 to 15 percent in number of cars to be built? After all, the automotive industry uses about 60 percent of all zinc die castings. One zinc industry spokesman says that an increase in the use of dinc die castings per unit will offset the decline in auto production.

DON'T TAKE CHANCES...

Use Celanese*

LINDOL* HF

the flame-resistant hydraulic fluid

PROVED IN 10 YEARS OF DIE-CASTING APPLICATIONS

- chemically stable
- non-volatile
- odorless
- low pour point
- non-corrosive
- excellent lubricant

Lindol HF—with over 10 years of on-the-job experience—provides an extra margin of safety for operators of hydraulically-activated machines. More and more plant managers today depend on Lindol HF to minimize the hazards of line breaks, leakage caused by vibration, and other mechanical failure.

Developed by Celanese, pioneer in flame-resistant fluids, lubricants, and additives, Lindol HF remains stable at the highest temperatures. It is unaffected by customary thermal and mechanical stresses . . . yields no obnoxious fumes since it contains no chlorine, nitrogen or inorganic salts.

Only minor adjustments, at most, are needed for immediate switchover to Lindol HF—in die-casting equipment, couplings, rams, presses, welding or riveting machines. Write for detailed bulletin.

Celanese Corporation of America
Chemical Division, Dept. 589-C
180 Madison Avenue, New York 16, N. Y.

CELANESE* LINDOL* HF

Appearance	Clear
Specific Gravity 20/20° C	1.160 ± .008
Boiling Range @ 10 mm. Hg. °C	255-295
Volatility, 6 hrs. @ 100° C, % max.	0.1
Flash Point, °F Tag open cup	440-465
Fire Point °F Cleveland open cup	685
Auto Ignition Temperature, °F	over 1100
Viscosity Range, Seconds Saybolt Universal @ 25°C	240-325
Pour Point, °C	—25 to —30
Weight, lbs./gal. @ 20° C	9.7

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

For additional information Circle No. 17 on the Reader Service Card

For additional information Circle No. 77 on the Reader Service Card →

Vanadium-Alloys

announces

a new **FM** series

FREE MACHINING

of free-machining steels*

in the following important tool steel grades

HIGH SPEED STEELS

RED CUT SUPERIOR FM
VASCO SUPREME FM
NEATRO FM
VASCO M2 FM
8N2 FM
VAN-LOM FM

DIE STEELS

OHIO DIE FM
(oil hardening, high carbon, high chromium)

CROCAR FM
(oil or air hardening, high carbon, high chromium)

SPEED CUT
(free machining die steel, produced since 1947)

For tool steel applications where *free machining* quality is desirable, we offer this new FM Series. Vanadium-Alloys FM steels machine more easily, permit better machined finish, and in certain instances show improved performance. To obtain free machining characteristics in the nationally-known steels listed above, simply specify the brand name desired, followed by the letters FM.

Complete information on our FM steels is available from your Vanadium-Alloys representative. Ask him for the facts.

*Several grades manufactured under U.S. Patent No. 2,204,283, Simonds Saw and Steel Co.

Vanadium-Alloys

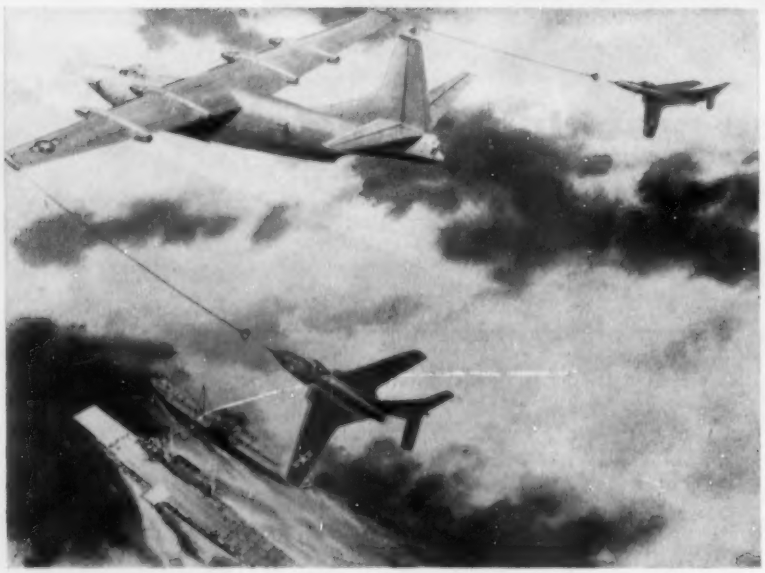
STEEL COMPANY

LATROBE, PA.

COLONIAL STEEL DIVISION • ANCHOR DRAWN STEEL CO.

HITCHINER

Precision Investment Castings help make possible *FLIGHT REFUELING*



The first crude attempts at refueling airplanes in flight were made about thirty years ago. Today, the procedure is completely routine and reliable beyond question.

Flight Refueling Inc., Danbury, Conn., manufacture the probe and drogue system which has now reached a high degree of perfection.

Hitchiner precision investment castings are found in critical spots in the operation and contribute materially to making it successful. They may contribute equally to your products that require complicated small parts.

If you are interested in knowing how your small parts may be made economically to close tolerances, send us your drawings along with your problems.

Send for your copy of this new booklet that gives interesting data covering the design, application and manufacture of Precision Investment castings. IT'S FREE.

HITCHINER Manufacturing Company, Inc.
MILFORD 7, NEW HAMPSHIRE
Representatives in principal cities.

For additional information Circle No. 38 on the Reader Service Card

Changes in personnel

JOSIAN G. HOLLAND has been elected a director of *Vanadium Corp. of America.* JACK M. ESTEN & ROBERT C. DIVOLL have been appointed abrasives engineer and field engineer respectively for the *Norton Co.*

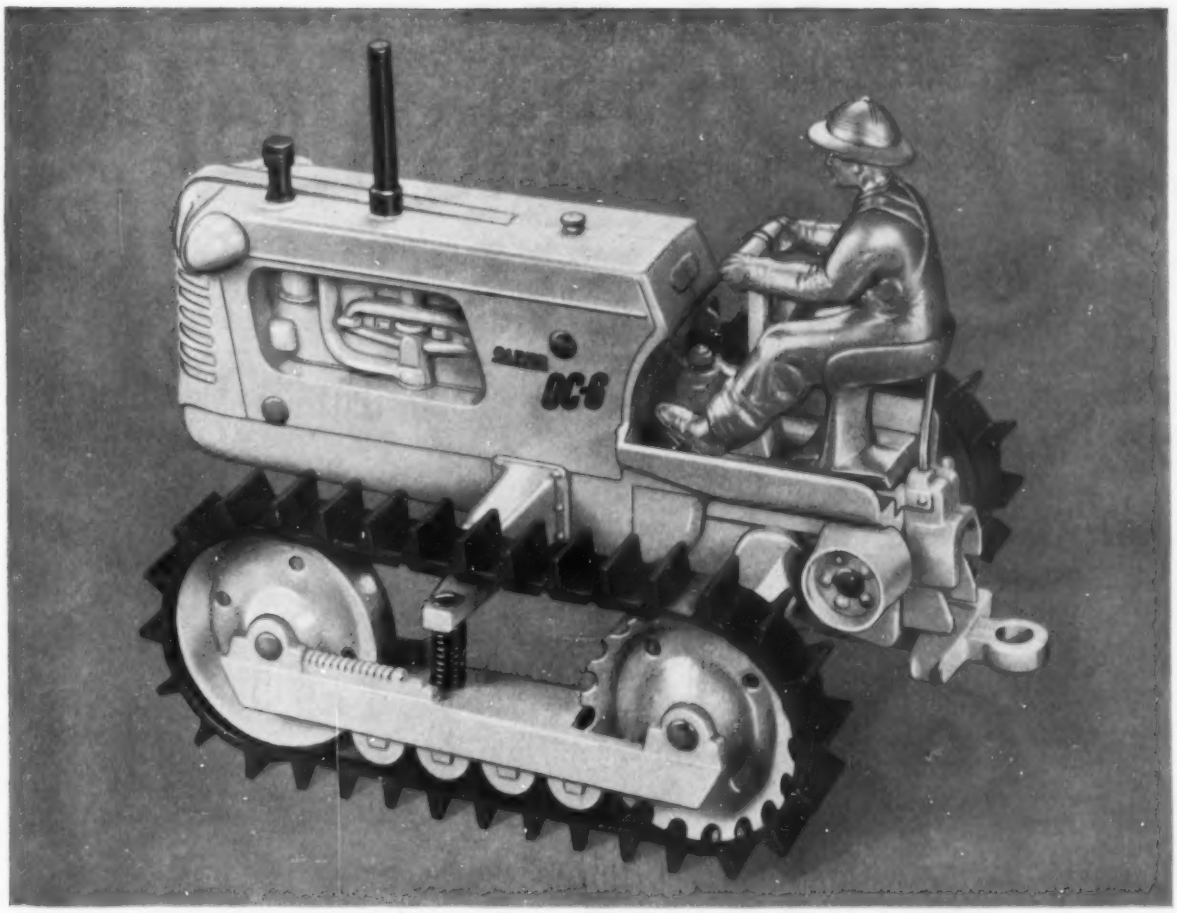
A. W. STODDARD has been made director of public relations and advertising by the *Detrex Corp.*

ROGER E. MARCE has joined the staff of *Wagner Bros. Inc.* as sales and service engineer. BERESFORD N. CLARK & HUGH W. McINTYRE have been appointed sales engineers for the *Surface Combustion Corp.* The announcement was made by HENRY M. HEYN, sales manager of the heat treat div.

ROBERT A. LUBKER has been named manager of the metals research department of *Armour Research Foundation of the Illinois Institute of Technology.*

F. J. TONE, JR. vice president and director of the *Carborundum Co.* has announced a number of new appointments and promotions. W. J. ULRICH, has been made vice president, F. W. BONACKER is now assistant vice president in charge of sales for the Bonded Products and Grain Div. W. J. KINGSLEY is the new sales manager for industrial product lines and J. G. FRITZINGER is sales manager for special accounts, both in the Bonded Products and Grain Div. Other Carborundum Co. appointments are

continued on page 30



miniatures

that stimulate sales with

MADISON-KIPP

zinc and aluminum die castings

The Oliver toy "OC-6" Crawler Tractor is a 16 to 1 die cast scale model of the actual tractor. It will "pull" a whole string of plows, wagons, scrapers, etc.

Tractor salesmen know how important it is to educate the younger generation on the advantages of modern methods. Boys and girls have undoubtedly influenced the purchase of a big percentage of the newer home and field equipment on farms.

Yes, the miniature plays an important role, so it must be made to high standards of quality and faithful reproduction of the full sized machine.

Madison-Kipp has produced the finest grade of die castings for the OC-6, and many other similar scale models.

kipp

MADISON-KIPP CORPORATION
213 WAUBESA STREET • MADISON 10, WIS., U. S. A.

• Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

For additional information Circle No. 52 on the Reader Service Card

NEW DIE CASTING MACHINE REVOLUTIONIZES INDUSTRY

)R BROADWAY | *Summary of the Week In F[illegible]* | FOOD OUTPUT RISES | NO DROP FOR FOR 1954 BU

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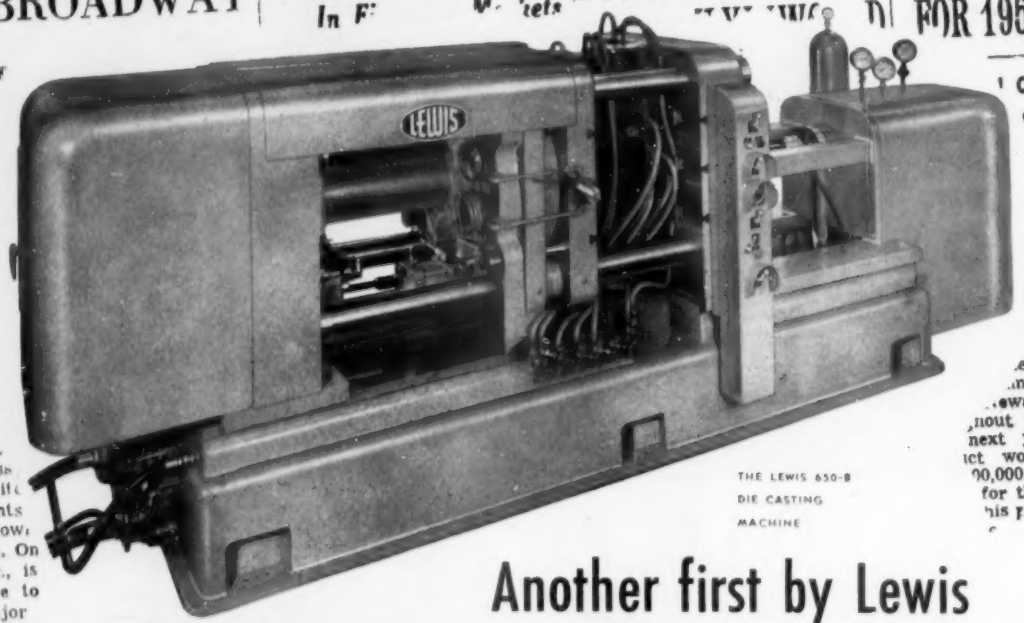

THE LEWIS 650-B DIE CASTING MACHINE

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FEATURING

hydra lock BY LEWIS

Another first by Lewis

Cleveland, Ohio—New speed, safety, and economy have been brought to the die casting industry with the introduction of the revolutionary Lewis 650-B die-forge casting machine. Key to its fast production of top quality castings is the new "Hydra-Lock" clamping mechanism, used in conjunction with a high-speed two-stage 100,000-pound injection system.

Users of this new machine find it mass produces aluminum and magnesium alloy parts faster and with less scrap. The 650-ton "Hydra-Lock" clamp not only provides maximum safety for high-speed production but also permits faster die setting and compensates for moderate misalignment of die faces.

Designers of the new Lewis 650-B machine have included every known feature to make the production of die-castings quicker, safer, and more economical.

1727-LW

Write for Bulletin 103 for details and specifications.

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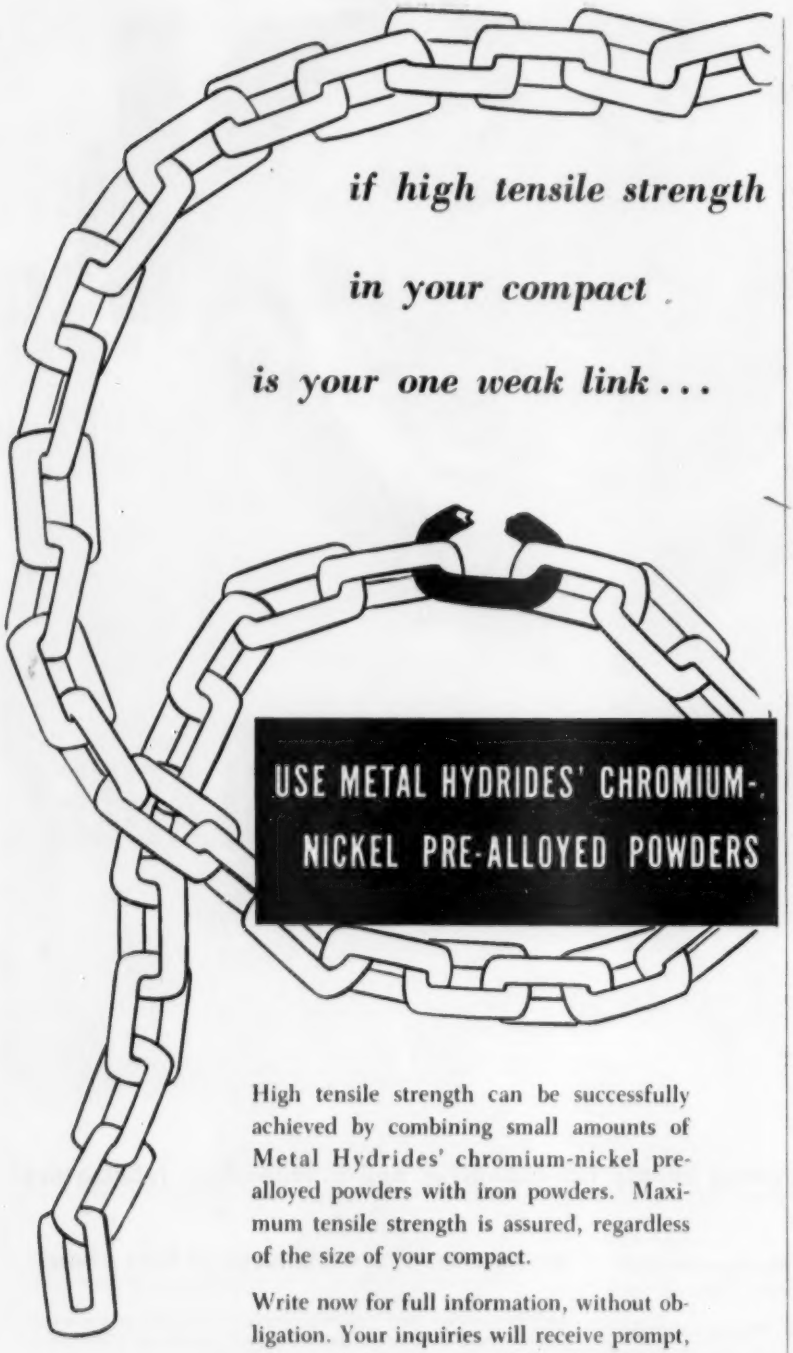

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PERSONNEL CHANGES
continued from page 26

JOHN F. CLAYDON as director of the industrial sales branch and H. P. DALES industrial sales manager of the Coated Products Div.

H. E. ELLIOTT has been made sales manager for the *Watson-Stillman Co. Div. of H. K. Porter Co., Inc.*

EUGENE L. COMBS has been appointed as supervisor of chromic acid sales for *Diamond Alkali Co.* Announcement was made by JOHN S. CORT, JR.

F. W. WILSON has been named president and A. W. SMITH manager of the newly formed *Efco-Lindberg, Ltd.* The new company is the result of a merger of Lindberg Electric Furnace Co. of England and Williams & Wilson, Ltd. of Canada.

EUGENE N. JARVIS has been named factory sales and service representative for the *Grav-i-Flo Corp.*

RAYMOND SZYMANOWITZ has been appointed executive vice-president of *Acheson Industries, Inc.*

W. TYRONE GILLESPIE has been advanced to the position of assistant to the president of the *Dow Chemical Co.*

CLYDE M. ADAMS, secretary of the *Bohn Aluminum & Brass Corporation* of Detroit, as deputy director of the aluminum-magnesium division, Business and Defense Services Administration, has been announced. He succeeds EVERETT G. FAHLMAN, president of *The Permold Company*, Medina, Ohio, who is returning to his company.

A. A. THROCKMORTON has been appointed sales manager of the *General Smelting Company*, Philadelphia, Pa., effective March 1.

"from qwertyuiop to zxc vbnm,./- DIE CASTING helps me type faster, better and longer"...

CASE HISTORIES FROM MT. VERNON FILES

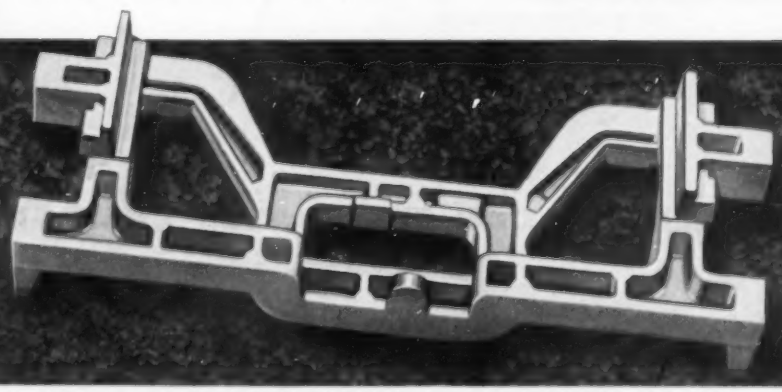
The new Smith-Corona "Eighty-Eight" is really a beauty. "Designed and built to out-perform any office typewriter ever made" is what its makers say about it.

And this is what they also have to say about the Mt. Vernon die casting shown below, which forms an essential part of the "Eighty-Eight.":

"This particular casting was designed for maximum torsional, compressive, and tensile strength. In an analogy of the automobile industry, this casting might be called the 'engine mounting' of a typewriter; the engine of the typewriter being the typebar segment. Because of the high strength characteristics needed for an 'engine mounting', we selected die cast aluminum. Other reasons for selecting die casting are its high degree of accuracy in contour and the lower cost of machining processes."

Whatever *your* product, whether simple or intricate, consult with us. We have up-to-the-minute facilities for die casting aluminum and zinc, and a vast reservoir of experience in die making. It's highly possible that we can help you, as we helped Smith-Corona, to lower unit costs . . . show you the way to improved products, too.

MT. VERNON
DIE CASTING CORP.
STAMFORD, CONNECTICUT



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We are BEE Mold and Die, Inc. of Phoenix, Arizona. We're in Phoenix because it is the heart of a skilled labor market—one of the few places left where you can find the old-time craftsman, the man who takes pride in his work on a job well done, who will bend his skills to the intricate work that **you** demand from us. We are equipped with the most modern and up-to-date tools and machinery available. And we're ready to do a perfect and exacting job for you.

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We custom-manufacture molds and dies for the rubber, plastics and metal casting industries. We devote our entire effort to this single objective. We help relieve your production bottlenecks by supplying you with the molds and dies you need—as fast as a perfect job can be turned out—and as economically as possible. The quality and precision of the tools we make are guaranteed. We deliver **F.O.B. your plant.**

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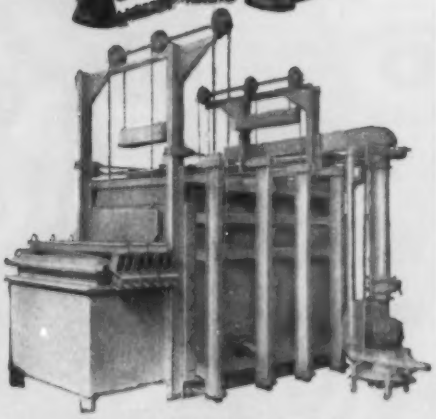
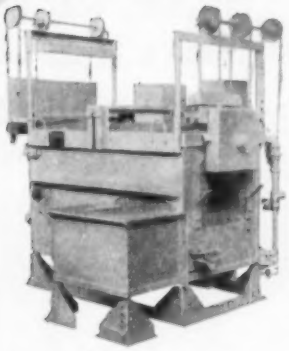


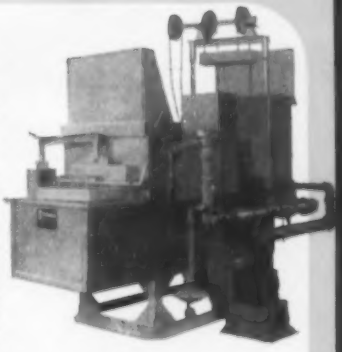
SMELTERS FURNACE

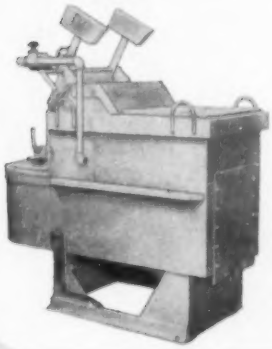
Built especially for smelters and other large melters. Easy charging, drossing, fluxing and alloying. Can be built to your own specifications. Capacities from 3000 lbs. Aluminum up.



MODEL "DC" FURNACE

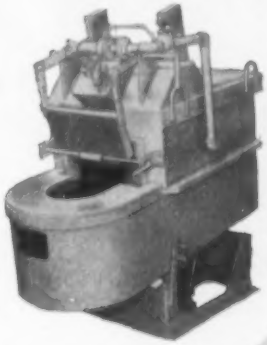
The 2 in 1 furnace. Breakdown and Holding in the same unit. Cold metal never reaches the molten bath. Assures metal of the finest quality on all classes of work. Close temperature control. Can be used as a sweat furnace for reclaiming inserts. Ideal for all types of plants including sand, permanent mold and die casting. Capacities from 350 lbs. Aluminum up.

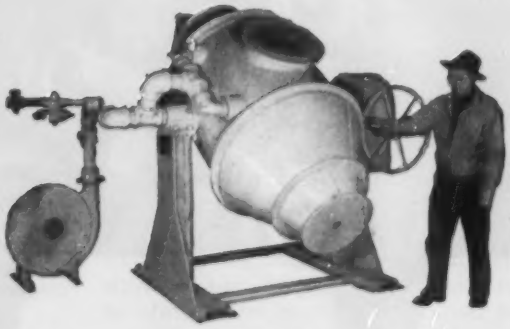




MODEL "DSC" DIE CASTING FURNACE

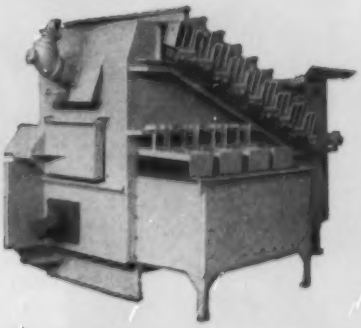
A small reverberatory furnace for melting and holding, or for holding only when hot charged at the die casting machine. Made in various sizes to meet your requirements.





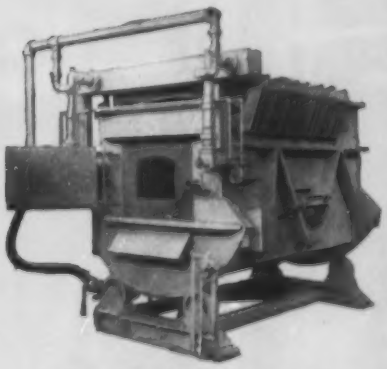
MODEL "BFC"

Hand tilt, open flame, barrel type furnace with flames firing tangent to inside of lining. Very fast melting. Used in all type plants including smelters. Capacities—500 lbs. Aluminum. A must for all aluminum jobbing sand foundries.



MODEL "MC" DIP-OUT TYPE

For melting and holding all in the same furnace. Hot metal always available. No iron pots or crucibles to replace. Capacities from 500 to 5000 pounds of aluminum.



MODEL "SW"—TILTING TYPE

Excellent to run back returns along with ingot required for permanent mold, die or sand casting operations. Also an ideal breakdown furnace. Capacities—600-1000-1700-3000 lbs. Aluminum.

STROMAN FURNACE & ENGINEERING CO.

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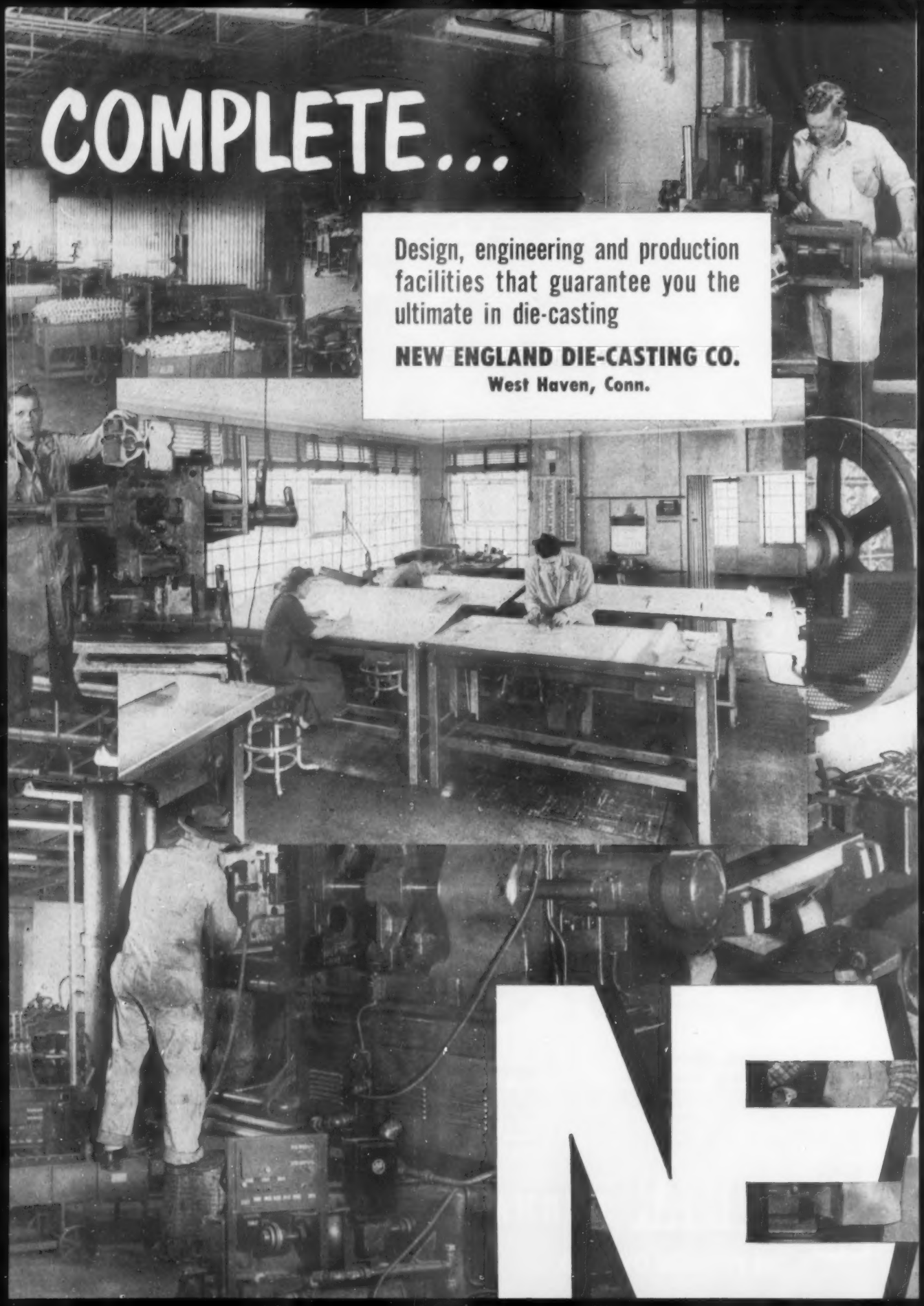
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Design, engineering and production facilities that guarantee you the ultimate in die-casting
NEW ENGLAND DIE-CASTING CO.
West Haven, Conn.
NE

Because powder metallurgy gives

Greater Freedom In Designing Contours

you get a better grip on these manual control buttons

ONE of the least expensive methods of manufacturing small parts is by the use of an automatic screw machine . . . provided the shape can be formed by axial rotation.

Often the design engineer, in an attempt to keep manufacturing costs down, will design a part for manufacture on a screw machine and then will find that the inherent roundness of the part is a serious disadvantage.

As formerly made, the manual adjustment buttons, for a steam vent valve manufactured by Anderson Products, Inc., are an example of this handicap.

These buttons were originally designed with a round, knurled grip. From the point of view of appearance the button had to be quite thin and the result was insufficient material to insure a firm finger grip. This was true even when a diamond knurl was used.

As a consequence, a pair of pliers would often be used, resulting in a ruined valve. Redesign was undertaken and the part, as illustrated at the right, evolved. To make this part economicially, only powder metallurgy was a possible manufacturing method.

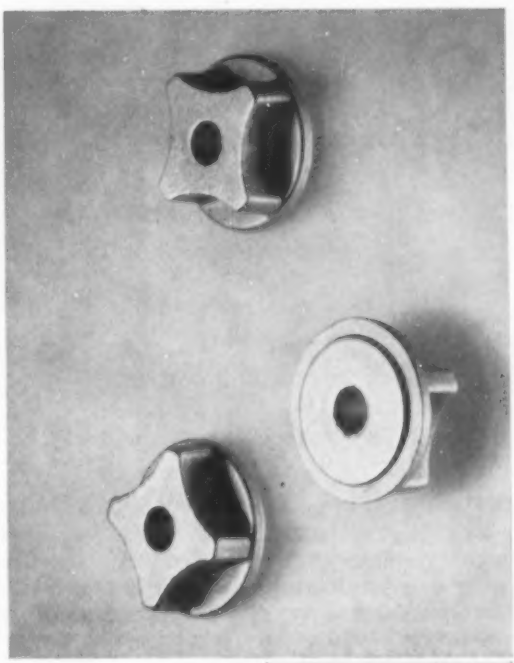
The button is now being made with finger indents by the Merriman Bros. Co., and is ready for nickel plating as it is delivered.

Another advantage came with the shift from brass bar stock to brass powder as a starting material. The buttons are held onto the stem by pressing them onto a splined portion. The splines prevent rotation of the button on the shaft and friction between the two pieces was supposed to prevent loosening. Since the brass bar stock was relatively hard, the splined shaft cut grooves that were often rather loose. With a powdered brass sintering, there is some compression of the material and elastic recovery then holds the button firmly.

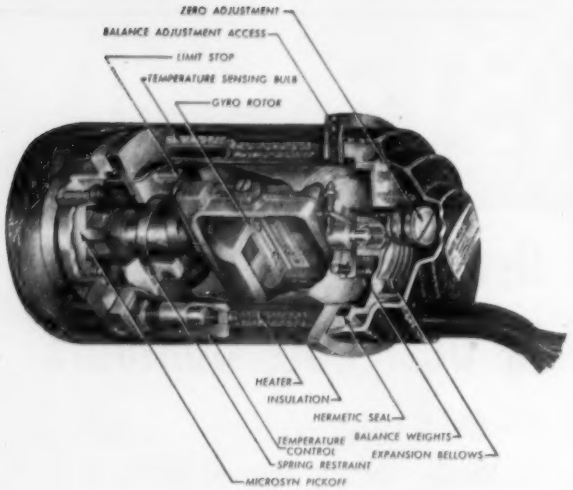
It is probable that annealing of the bar stock after machining would have given adequate gripping of the button on the stem, but this would have involved another operation at an increased cost.

One problem that is often associated with metal powder compacts is that of surface finishing. In the case of these brass powder parts, no trouble has been encountered. In production, they are barrel plated with nickel, using standard plating techniques. As a rule, prior to plating the parts are tumbled to remove any burrs and sharp edges and to polish the parts to some extent. As nickel plated, there is an adequately good match between the button and the valve housing.

As far as cost is concerned, the powder part is at least as expensive and possibly a little more expensive than the older piece it replaced. However, positive fingertip operation and better holding properties justify any slight increase in manufacturing costs.

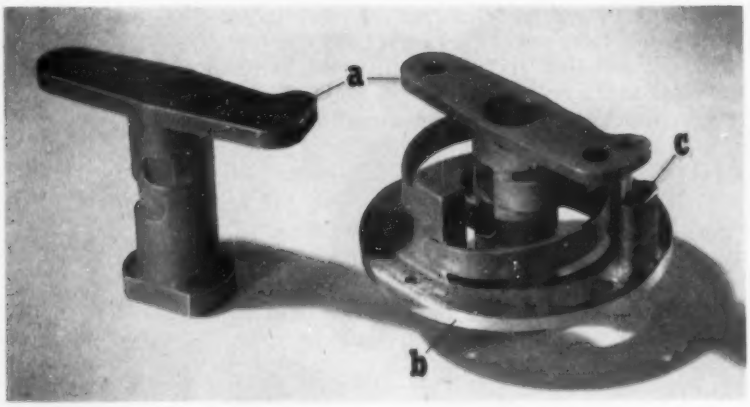


BY W. T. FERGUSON, Chief Engineer
Anderson Products, Inc. Boston, Mass.



1. MEASUREMENT of absolute rates of rotation is the function of this Doelcam rate measuring gyroscope. It is thermostatically-controlled and hermetically-sealed to insure highest accuracy.

2. SPRING ASSEMBLY, below, incorporates two investment castings: the torque tube (a) and the spring holder (b), both of which have replaced brazed assemblies requiring multiple machining operations.



WHEN it is necessary to plan small components which have a high order of rigidity and, at the same time, as low weight as possible, the designer is faced with a dilemma: add to the weight in order to guarantee stiffness, or accept greater deflection in order to save weight.

Unfortunately, in the design of aircraft gyro instruments, compromises of this sort cannot be tolerated. For example, it is apparent that an instrument for measuring absolute rates of rotation would have to have a high degree of structural rigidity to prevent the introduction of errors. Closest limits on deflection would have to be held on each of many structural components.

On the other hand, such an instrument, intended for aircraft use, may not have an ounce of weight which can possibly be pared off.

Rate measuring gyroscopes manufactured by Doelcam Corp. are of this character, being used in numerous nautical and aeronautical installations for rate computation, flight testing, stabilization and control.

These instruments are thermostatically-controlled and hermetically-sealed in an inert atmosphere. The section view, Figure 1, reveals how the gimbal is mounted in precision ball bearings and is elastically restrained from rotation by a low-hysteresis, balanced spring assembly.

This balanced spring assembly offers a clearcut example of the way in which a pair of investment castings has fulfilled the requirements both as to stiffness and lightness and, at the same time, have simplified procurement and production of this critical assembly, Figure 2.

Brazed assembly vs investment castings

The spring assembly is made up of a torque tube connected to a spring holder by means of two accurately calibrated springs. The torque tube, Figure 2a, is mounted at the rear of the gimbal and is thus the intermediate member between the spring restraint and the gyro gimbal.

The torque tube was originally made by

When a designer is faced with the need for greater stiffness in the structure of his product, but cannot afford to increase wall sections, he may find that investment castings give him the answer to his problem . . .

Problem: To Reduce Mass Without Sacrificing Rigidity

BY J. B. LYONS, Subcontracting Buyer, and
A. M. CAMBELL, Chief Mechanical Engineer,
Doelcam Corporation, Boston, Mass.

turning the shank from bar stock, profiling the large end piece from sheet, and brazing the two together. In addition, the recesses where the spring is attached were milled into the shank.

Problems of rigidity presented themselves, and the entire assembly seemed unnecessarily laborious. Investment casting was studied.

The problem was discussed with Hitchiner Manufacturing Co., Inc., who undertook to produce this piece as an investment casting in S Monel. The results have been outstandingly successful, for not only has a more rigid one-piece construction replaced a brazed assembly, but there has been a saving in cost due to the elimination of turning, profiling, milling, drilling, boring and brazing. Only machining now is to face top and bottom, drill mounting holes and chamfer the center hole.

S Monel was chosen for the casting because its coefficient of expansion is close to that of the rotor material and it is a hardenable alloy.

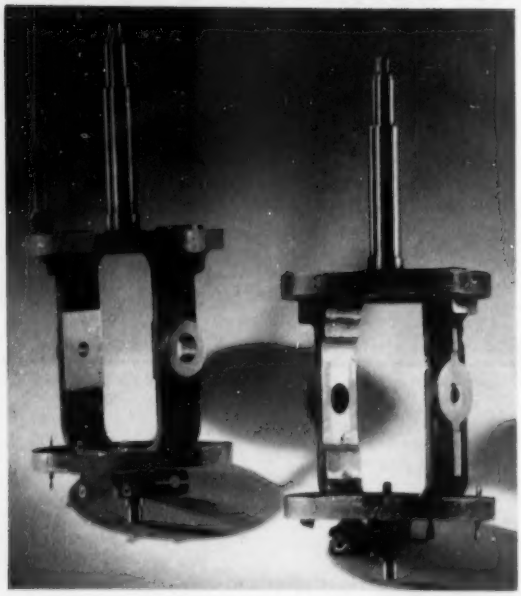
Similarly, the spring holder, Figure 2b, has been redesigned from an assembly to a one-piece investment casting, with improved rigidity and lowered cost.

This piece was originally cut from bar-stock, with two studs attached to it, one by welding, the other by brazing. Now cast as a unit, ample fillets have been provided to stiffen the bosses, one a square and the other an oval shape. Drilling and tapping of mounting holes, and drilling of a hole for locating pin which must be exactly positioned, are done after the springs are brazen into position — none is done before brazing.

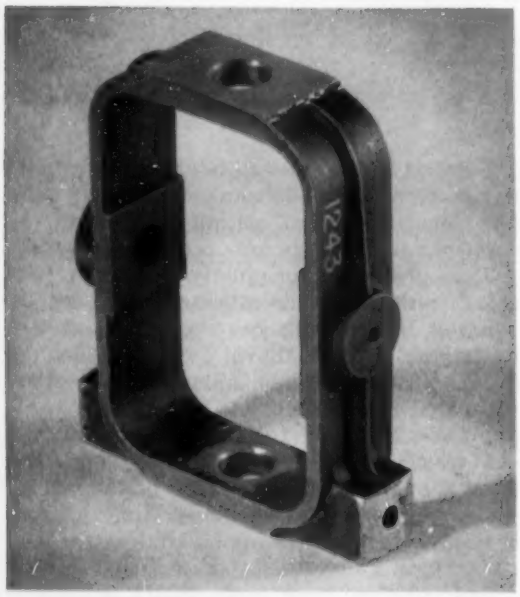
Improvements in design detail made possible by this investment casting include the provision of an oval boss, Figure 2c, which allows more latitude for pin-location; and provision of a cored hole with a flat inside to give additional strength to the post that receives the spring.

S Monel is readily brazed, and the springs can be attached to the torque tube and spring holder without difficulty.

continued next page



3. COMPARE THESE FEATURES of the investment cast gimbal (left) and the sand cast gimbal (right) and you'll see the advantages of the former: Amount of metal around the horizontal shaft holes; amount of machining on interior surface; uniformity of wall section; amount of radius inside top and bottom.



4. AT ONE TIME, when this gimbal was sand cast, rejects for porosity were as high as 80 percent. X-ray inspection was made on every piece. Now, the use of investment castings has eliminated this problem.

Thinner Walls Not Only Reduce Weight, But Also Solve Porosity Problem -- Cont.

The spring holder is heat treated at 1400F for one hour and furnace cooled. Hardness is 27-40 Rockwell C.

Sand casting vs investment casting

Four other investment castings are employed in the rate measuring gyroscopes, the gimbal, thermostat bellows housing, switch actuating lever, and a bushing — all cast by Hitchiner Manufacturing.

Of these, most interesting and significant from a production viewpoint is the gimbal which was formerly a sand casting.

A serious problem with these gimbal sand castings was the high rate of rejects due to blowholes. Machining opened up blowholes in the area around bosses and other thick sections. At one time, the rate of rejects was as high as 80 percent, and X-ray inspection of all castings was introduced.

Obviously, this condition was intolerable, and investigation of possible investment cast gimbals was undertaken. It was found that where the sand cast gimbal walls had to be excessively thick in order to provide stiffness and to allow stock for machining, the investment cast walls could be made much thinner with ribbing to provide stiffness without weight. This made wall sctions thinner and eliminated most of the porosity problem.

When first made by investment casting, bosses for the rotor shaft were cast solid and the holes drilled. Because the size and location of these holes are very critical, it was felt that they should be drilled. When it was found that porosity occurred in the bosses, the investment caster cored undersize holes which cured the porosity problem.

Now, not only has the porosity problem been solved, but the total mass has been reduced and a great deal of machining eliminated, as a comparison of the two castings in Figure 3 will reveal. As an example of this, the radius between the sides and base were previously machined, but can now be cast to

continued on page 94

- Tolerances on most openings are ± .001.
- Radio sets are submerged in 20 feet of water for 24 hours.
- Wide variations in section thickness restrict metal flow.

Requirements like these are why they said . . .

It Couldn't Be Cast

A genuine "problem" die casting . . . difficult to die cast, but almost impossible economically by any other method . . . was recently completed by a small Eastern die casting firm.

Production on this casting, a die cast aluminum face panel for a complex two-way military radio set, was successfully completed by Tri-State Die Casting Company after a year and a half of concentrated effort.

Specifications on dimension and shape and high requirements for watertightness around the numerous openings in the casting, made this job a die casting nightmare . . . there were many who said specifications could not be met by a die casting.

The story of how the rigid specifications of the Army, and of the prime contractors, Crosley, Magnavox, Dumont, and Federal Telephone, were met, represents an outstanding accomplishment of America's commercial die casting industry.

continued next page

Watertight die cast panel assures perfect radio operation after Army's 24-hour dousing

IT COULDN'T BE CAST — cont.

During World War II, the company had extensive experience casting brass and zinc Ordnance materiel, but relatively limited expreience with aluminum. When the face panel was undertaken, it soon became apparent that lessons learned ten years earlier weren't sufficient meet today's military requirements.

Building a mold was the first headache. Metal had to be made to flow through some sections as thin as 1/16th of an inch to others that were one inch thick, and through extremely narrow "gates" to other wide sections.

Moreover, tolerances were very close, as is the Army's custom. The 26 openings in the panel for dials and control knobs had to be cast or machined perfectly so that the set would be watertight. The allowable plus or minus on most of the openings was .001.

The panel is for the RT 66, 67, 68, and 70 receiver-transmitters, designed as mobile equipment and subject to all manner of abuse in the field. One of the Army's tests is to submerge the set in 20 feet of water for 24 hours, then check its operation. Cost of the set is about $1,000.

Studying blueprints and building a few experimental models, the company estimated that machining operations could be held to a maximum of ten, although to achieve that goal, casting would have to be far more exact than anything the company had ever done. Several weeks were spent before production got underway, simply studying the flow of aluminum, trying new lubricants, raising and lowering the molten metal temperature, and adjusting the dies.

It was a tough job that the company's die designers and die makers solved by repeatedly rebuilding the mold, studying results, making adjustments, and studying results again. After prolonged effort, production got to the point where more good pieces than bad ones were coming out of the die.

However, some compromise was necessary because all tolerances couldn't be met by casting. Tri-State raised its estimate of the number of necessary machining operations to 23.

Hundred Percent Inspection Raises Costs

Then a serious blueprint error threw the whole plan out of gear. **The prints had failed to show that 15 openings in the panel were to be pressure sealed with very thin rubber gaskets.** This meant the surfaces around the holes, rather than the cylindrical borings themselves, were critical down to about .001, since even a slight flaw would mean the Army's radio no longer would be watertight.

Milling all the pressure seal surfaces was the only way to attain tolerances and the cost shot up.

Concurrent with the die casting problems were complications of machining. The panel has 28 "blind" tapped holes, and meeting tolerances on depth and radial dimensions was a frustrating experience. All the holes were specified for a class two fit, extremely close

continued on page 89

Circle No. 5 on the Reader Service Card

telling the story of dag dispersions

Dry-Film Lubricant
Stops Sticking in Die, Improves Finish

'dag' colloidal graphite dispersions — applied by spraying, painting or dip-coating — form slippery *dry lubricating films* on die surfaces.

The film is wholly unaffected by heat up to 750°F. It prevents sticking in the die...improves product finish...reduces carbon build-up in die impressions. Lubricates ejector pins and plungers, too.

You can have more information by asking for Reprint DC and Bulletin No. 426-C

Dispersions of molybdenum disulfide are available in various carriers.

We are also equipped to do custom dispersing of solids in a wide variety of vehicles.

dag DISPERSIONS **Acheson Colloids Company,** Port Huron, Mich.
... also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

try 'dag' resin-bonded dry films for permanent lubrication

AIR CAP BODY — Like the thumb nut knob, a light facing operation on the two flat surfaces and inside threading are all that is required; then it is ready for barrel finishing.

THUMB NUT KNOB — To finish this piece the flash is trimmed and a thread cut on the inside. Surface finishing is by barrel polishing.

GEAR COVER — Trim the flash, clean up two holes, and surface finish are the operations required on this cover.

VALVE HANDLE — Drill and tap a set screw hole and then polish. Occasionally the cored hole has to be cleaned up.

BEARING COVER — Clean-up, surface finish and paint are the operations required to complete this casting.

IDLER CARRIER — By center marking two holes that must be drilled after casting, the use of locating jigs has been eliminated for this piece.

Hand Tool Built With 10 Die Castings

BY HERBERT CHARLOP, Project Engineer,
Metallizing Engineering Co., Inc.

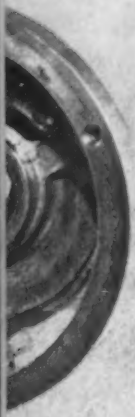
WITH A METALLIZING GUN such as this one manufactured by Metallizing Engineering Co., Inc., of Long Island City, almost any metal that can be made in wire form can be sprayed to rebuild worn parts, or correct mistakes in machining.

Because the gun is often hand held, it should be as light weight as possible to reduce operator fatigue. Also, to make it applicable in the greatest number of shops, it must be as inexpensive as possible. These two considerations dictated the choice of eleven different aluminum die castings for use in the tool. Aluminum for its light weight and die casting to lower machining costs. This latter item of lowered machining costs has been true in spite of the fact that this particular model is a rather low production item, less than 10,000 per year.

Die casting, because of its inherent accuracy produces castings on which a minimum amount of secondary machining must be done. Further, the as cast surface is ready for finishing by polishing and buffing without any surface grinding or sanding other than flash and gate removal.

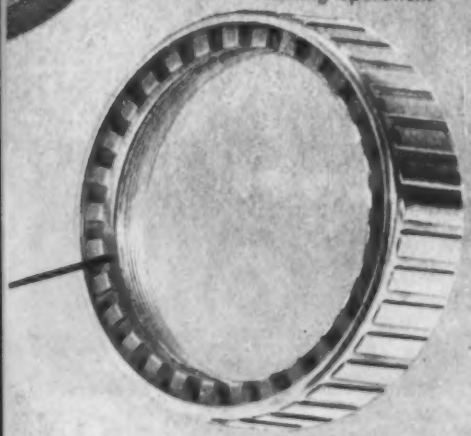
All of the castings used on this model of the metallizing gun are made by the Mt. Vernon Die Casting Corp.

In order to keep machining to a minimum, the foundry works to somewhat closer than usual tolerances. Except for specially noted cases, dimensions are held to ± 0.0015 per inch with a minimum tolerance of ± 0.002 called for on dimensions less than one inch. Wherever possible, necessary brass and bronze inserts are cast in.



TURBINE COVER — The bronze bushing is cast-in on this part. Finish machining is limited to turning, drilling and tapping. Four surfaces must be faced.

CONTROL RING — No process, other than die casting, could form the positioning detents and the channeling without subsequent major machining. The channel is cast blind and opened by a simple turning operation.



CENTRAL HOUSING — One of the most complex castings used on this gun. Nineteen holes of various sizes and shapes are cored. Finish machining is largely by drilling, tapping and facing.

HANDLE — Other than surface finishing, this casting is ready for installation after flash trimming and tapping.

You get beauty with a personal touch in the new Underwood 150.

How make 1

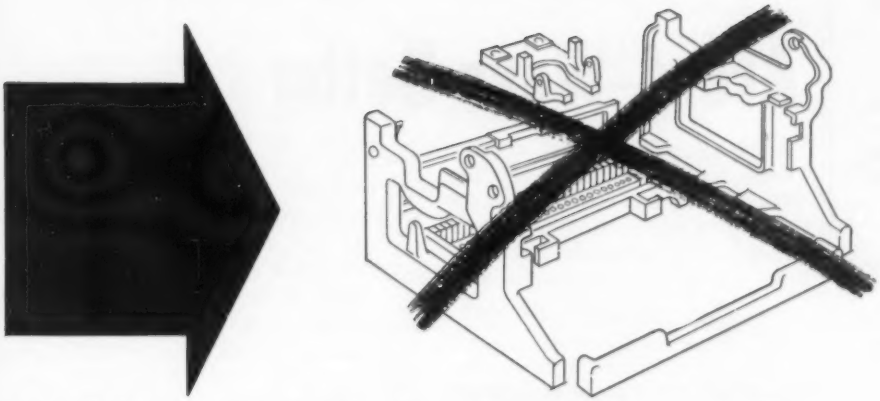
This is the die cast aluminum main frame in the new UNDERWOOD 150 standard typewriter.

It replaces six sand castings...saves 4½ pounds overall weight . . . eliminates frame assembly, much frame machining, and many fasteners and other small parts.

More than that, it highspots the hidden benefits you can build into a product with die casting when, like Underwood, you bring Doehler-Jarvis in at an early stage in design.

Look, for example, at the areas marked with an "x". Each is a spot where die casting effects a production saving . . . where, perhaps, die cast precision eliminates surface machining . . . or where a part is integrated into the original casting rather than assembled.

Notice, too, how the designers use the high strength characteristics of thin die cast sections. The one-piece homogeneous die casting gives Underwood a "built-in" rigidity and dimensional stability, eliminating size variations and "weave" often experienced in built-up assemblies. They use this property to "open up" sides and back of the frame for easy access in assembly and



Doehler-Jarvis helped Underwood

casting do the work of 6

service. They use it to provide vertical mounting for the mechanism and, thus, to eliminate drilled holes in exterior surfaces.

And see how ingeniously even the gate of the casting is employed. (See area "y".) It is left in position to provide rigid support and insure dimensional stability during drilling and machining. Only then is it discarded.

Now examine the dense, non-porous surface structure. It needs no dip coat and thus eliminates still another process step.

Like many another user of Doehler-Jarvis die castings, Underwood converts into product improvements the savings they realize through die casting. Their new UNDERWOOD 150 gives users a lot more typewriter than ever before – yet it costs no more.

In its half century of die casting, Doehler-Jarvis has helped many producers, big and little, give customers more product for the money . . . among them some of the best known makers of automotive, electrical, communication, household, office and other types of equipment.

They count on Doehler-Jarvis for both the resources and the resourcefulness they need to take full advantage of the die casting process. You can count on Doehler-Jarvis, too.

So when you have a new product on the boards – call in Doehler-Jarvis.

Doehler-Jarvis Division
of
National Lead Company
General Offices: Toledo 1, Ohio

*Reg. U. S. Pat. Off.

For additional information Circle No. 25 on the Reader Service Card

Control of impurities that cause "self-destruction" of anode is better in cast alloy.

Fine grain structure of casting gives a more efficient corrosion pattern.

Permanent mold cast anode is easier to attach because core-wire protrudes from the end.

Replacement anodes can be economically made in connected 12-inch sections without loss of electrical efficiency.

Cast Anodes For Cathodic Protection Are 4-Ways Better

BY ALBERT GRAVER, Chief Engineer
Patrol Valve Co., Cleveland, Ohio

1. REPLACEMENT ANODE shows flexible steel core which can be cast as an insert.

IF it were possible to make a hot water storage tank of absolutely pure iron and . . . if it were possible to make all connections and attachments to the tanks of the same material or . . . if it were possible to apply to the tank and all connections and fittings a completely impervious coating of zinc then . . . protection against corrosion under most water conditions would be unnecessary.

But none of this is economically possible so that it becomes necessary to provide a method of protection that will, in effect, achieve the same result at a moderate cost.

The modern industrial method of applying cathodic protection is to provide some sort of an electrical suppressor and one device for accomplishing this is the magnesium anode.

Since the solution potential of magnesium and magnesium alloys in an electrolyte is considerably greater than the solution potential of either zinc or mild steel, it follows that if a cell is set up with magnesium as one electrode and either zinc or mild steel as the other electrode there will result preferential solution of the magnesium.

The solution potentials of various metals and alloys in 1N sodium chloride solution is shown in Table No. 1. Based upon its position in this table magnesium will protect from corrosion any of the metals below it.

Metallurgical mechanical and electrical requirements have dictated the method of manufacture of magnesium anodes. Almost all of them are made by either permanent mold casting or by extrusion

and of these two methods, permanent mold casting has many advantages.

Metallurgical Advantages of Permanent Mold Casting

Cathodic protection through the use of magnesium anodes is not simply a matter of sticking some magnesium metal into the tank and connecting it both mechanically and electrically to the tank.

Research laboratories that have conducted high caliber research on the use of magnesium anodes have proven that certain concentrations of impurities in the magnesium cause "self destruction" of the anode. These concentrations of impurities are less critical and more easily controlled in alloys which may be cast.

The grain size of magnesium anodes used for cathodic protection on hot water storage tanks has a marked effect on the corrosion pattern of the anode. Large grains of metal will, as a rule, cause deep and large pits in the anode and considerable metal is wasted by dislodgement. Fine grain structures will give a close knit corrosion pattern and optimum results are received from the same amount of metal. Grain size can be easily controlled in permanent mold cast magnesium anodes.

Mechanical Advantages of Permanent Mold Casting

Sections of an anode rod are dissolved more rapidly than others — near the top of the tank and near the bottom. The reason for this is obvious, those particular areas must protect the side walls and the top and bottom. The higher rate of solution results in a necking down of the anode, as shown in Figure 2.

Near the bottom, this necking down results simply in rapid loss of magnesium. Near the top, however, it will result in mechanical failure of the anode rod. To avoid this mechanical failure, the anodes are made with a steel wire core.

With an extruded anode the core wire is flush with the ends of the rod since any rod is simply a section of a much longer one. To fasten the rod into a pipe fitting, one must either thread the magnesium and screw it into the fitting or machine away the magnesium to expose the steel wire for brazing or welding.

If a threaded connection only is used it may in time loosen and the rod fall out. If magnesium is machined away, there is a material loss as well as a machining charge.

With a permanent mold casting, on the other hand, the casting is made with the core wire protruding from one end. Mechanical fastening to a fitting is then very simple, it may be either welded or brazed and no extra machining is required.

Electrical Advantages of Permanent Mold Castings

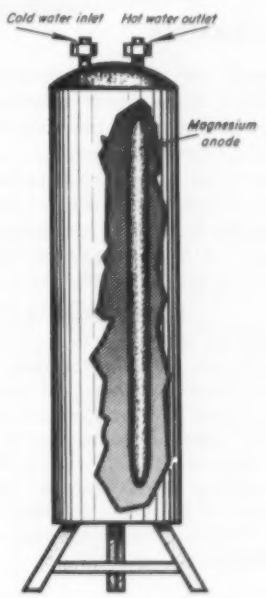
Under most water conditions, there must be a solid, low resistance electrical connection between one end of the anode and the tank. With the steel core wire welded or brazed to the fitting this is easily accomplished. On extruded anodes, however, where the magnesium is threaded and screwed into the fitting there may be, over a period of time, a layer of high resistance salt formed in the threads which will cut down or completely stop current flow with consequent diminution of the effectiveness of the anode.

Where the anode is not original equipment but is inserted into the tank through a port (usually the hot water outlet) some flexibility must be allowed since there is sel-

continued on page 84

TABLE 1
Solution Potentials Measured in Sodium Chloride Solution

Metal or alloy	Potential in volts
Magnesium	—1.73
AM3S alloy	—1.71
AM57S alloy	—1.68
AM240-T4 alloy	—1.66
AM265-T4 alloy	—1.63
Zinc	—1.10
220-T4 aluminum alloy	—0.96
56S-O aluminum alloy	—0.87
52S-O aluminum alloy	—0.85
2S, 3S, 53S-T, 43 aluminum alloy	—0.83
Cadmium	—0.82
356-T4 aluminum alloy	—0.81
355-T4 aluminum alloy	—0.78
195-T4 aluminum alloy	—0.70
17S-T, 24S-T aluminum alloy	—0.68
Mild steel	—0.67
Lead	—0.55
Tin	—0.49
Brass (60-40)	—0.28
Stainless steel (18Cr-1Ni)	—0.28
Copper	—0.20
Stainless Steel (18Cr-8Ni)	—0.15
Monel Metal	—0.10
Silver	—0.08
Nickel	—0.07

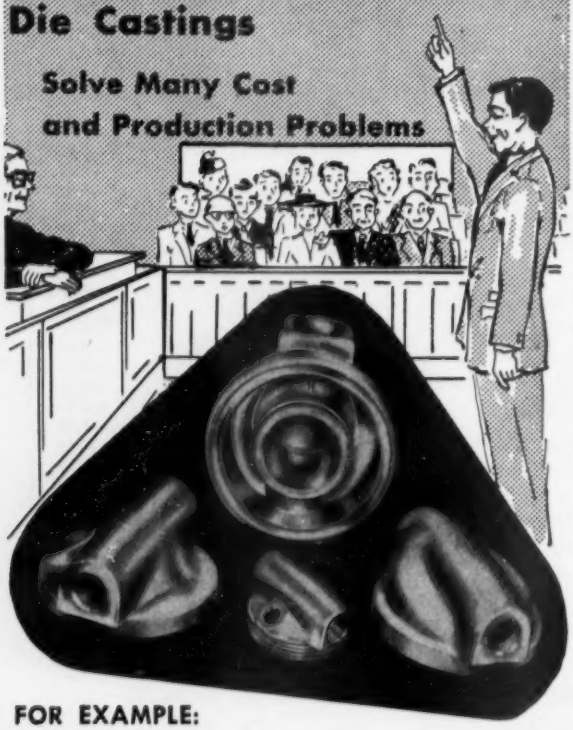


2. PHANTOM VIEW illustrates erosion of anode near top and bottom of the hot water tank.

ALL YOU Want— Are the FACTS

Aluminum and Magnesium Die Castings

Solve Many Cost and Production Problems



FOR EXAMPLE:

The heads for air line lubricators and filters shown here have been ideal *solutions* for designers and engineers who have been on the *trail* of production costs. Cost Savings resulting from virtual elimination of machining labor combine with the attractive designs permitted by die casting. They open new markets for these products as produced by such manufacturers as Keller Tool Co. and Master Pneumatic Supply Co. for a highly competitive field.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists—men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs—little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

Write today for literature and design information. Quick action on inquiries.

LITEMETAL DICAST, Inc.

A DIVISION OF HAYES INDUSTRIES

1925 WILDWOOD AVE. • JACKSON, MICHIGAN

PLANT AND EXECUTIVE OFFICES

Circle No. 50 on the Reader Service Card

High Tensile Aluminum Die Castings In Weld Positioner

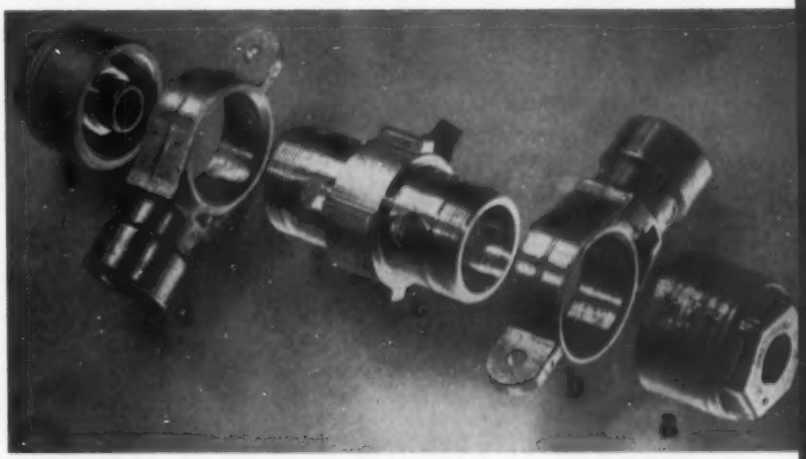
FOR the high tensile aluminum frame of a newly introduced weld positioner, aluminum die castings have been used to hold three 45-pound pull, neoprene covered, Alnico V, permanent magnets.

Combination of strength, smoothness and accuracy of the die casting have been considered in this new product which is described as a completely universal holding fixture for production and welding operations. It is manufactured by the Standard Portable Cord Co., Inc., of Jamestown, N. Y., and is called the "Magic Positioner."

When positioned (each magnet has full 360 degree adjustment) the magnets can be locked in place to hold almost any shape or design or metal to be welded. It is said to eliminate costly fixtures for short runs, as well as two-man maintenance and production welding.

Two Different Parts From One Die Cavity ...

doubles the economy of die casting



BY V. WEBER, Vice President
Robertshaw—Fulton Controls Co.,
Pittsburgh, Pa.

THE use of aluminum die castings in a mass production item is not new. At the level of original design it is very often possible to determine that the die casting process will be the most economical one to use and design can then proceed along such lines as are dictated by the most advantageous use of parts made by this process.

In the case of the safety pilot valve Robertshaw-Fulton Controls Co. engineers determined that certain basic design requirements called for at least four of the five housing components as castings — die castings in aluminum were selected.

Further, when the design was carried close to finalization, the two pieces carrying the pipe connections (parts b and d illustrated could easily be designed to be identical so that one set of dies and one machining set-up would suffice to make both parts. This constituted one marked saving made possible by a die casting.

The two end caps (parts a and e illustrated) have the same external size and shape, but differ inside. However, the parts could be so designed that by casting a single piece and, as a second operation, remove a cast-in seat inside, then identical castings could be made. In spite of the fact that removal of the cast-in seat meant longer time on the machine it was more economical to do this than to make a separate casting.

It is of interest to review the actual machining operations that are necessary on these castings. Caps: thread inside and face two seats; Inlet and outlet: thread for tubing connection, face two surfaces, bore to tolerance of 0.005 total.

Surface finish is by barrel tumbling to remove burrs and polish.

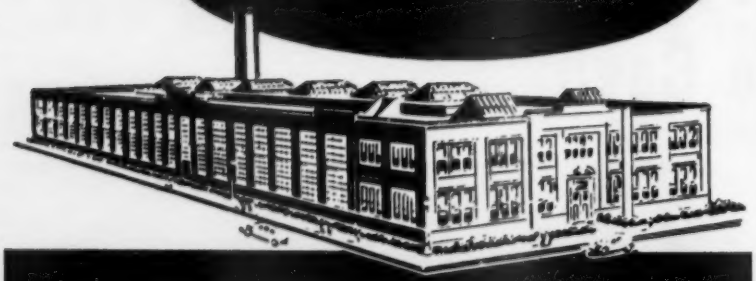
This, then, is a case where functional requirements would permit the modification of design to take advantage of most of the advantages offered by the die casting process. The amount of machining that

continued next page

This company's California plant uses a die cast valve body . . . It's Eastern plant is using an extruded valve body. To find out why two different methods are used, turn to page 84.

For additional information Circle No. 19 on the Reader Service Card

From One Source



A COMPLETE DIE CASTING SERVICE
. . . FROM DESIGN TO FINISHED PRODUCT.

No matter what your die casting requirements may be, Central has the facilities, the equipment, the experience and trained personnel to produce castings to meet your rigid specifications. Take advantage of Central's complete facilities and be assured of prompt economical service on the best castings made.

- Complete engineering and design service
- Die and tool making
- Most modern production equipment
- Research and quality control facilities
- Machining and finishing

May we help you with your production requirements.

Write today for prompt and practical assistance

CENTRAL Die Casting & Mfg. Co.
2935 W. 47th Street • Chicago 32, Illinois

You can buy Quality **PISTON RINGS** *in small Quantities at* **ATTRACTIVE PRICES**

Auto-Diesel Engineers have developed a new Plunger Ring that will last for months instead of hours. If you are operating die-casting machines or casting zinc parts you will be interested in the following.

On August 10th a set of rings ⅜" wide, two rings to a plunger was put into service. The plunger was taken out September 6th. The rings were in serviceable condition. The same machine and plunger were put into operation again USING THE ORIGINAL RINGS.

Auto-Diesel Plunger Rings are made of cast iron, dieloy cast iron or hardened steel. You can greatly reduce your plunger ring bills and reduce expensive down time to the minimum. It will pay to write at once for prices.

AUTO-DIESEL TWO PIECE SEGMENT RING

Auto-Diesel makes a complete line of two piece Segment Plunger Rings for hot chamber die casting machines. These rings are made of high grade wear resisting cast iron. They are quality rings that will give you good service and are priced right. Casting sizes available: — 1½", 2", 2¼", 2½", 2⅝", 2¾", 2⅞", 3", 3½", 3¾", 3⅞", 4" by ⅞". Write today for prices. We can make prompt delivery.

Write for Details

THE AUTO-DIESEL PISTON RING CO.
3135 Superior Avenue • Cleveland 14, Ohio
"RINGS and SHAPES Since 1921"

For additional information Circle No. 10 on the Reader Service Card

ONE CAVITY —
TWO CASTINGS — cont.

must be done is only a fraction of that required on a sand casting for the same job, there is no danger of leakage of gas due to porous castings and the die costs, (roughly $6000) were rapidly amortized by the machining savings.

The central body section (part c) brings up other considerations not present in the parts previously considered. Here manufacture could be by castings, machining from bar or tubing stock, or machining from an extruded shape. Since quantities were large enough to warrant considering a special extrusion only that method and die casting were considered.

Robertshaw-Fulton Controls Co. manufactures the safety pilot valve in two plants, one in Pennsylvania and the other one in California. Both of these plants make this same valve. When the bids were all in, the cost of machining an extruded shape was the same as the cost to die cast and then machine. Extra work and rather special machine work was required when an extrusion was used.

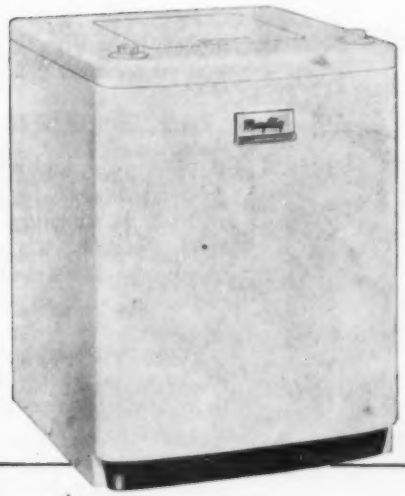
It followed then that in the Pennsylvania plant where the machines and the machine time were both available, it was better to use an extrusion and thus reduce overhead on equipment which would otherwise be idle. In the California plant, however, the required machine tools would have to have been purchased and hence die casting became the more economical by avoiding a large capital investment.

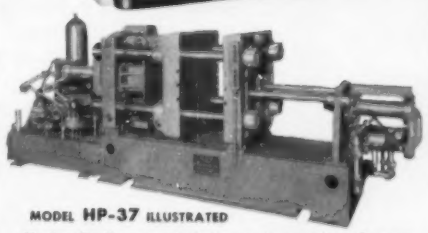
ZINC INSTITUTE MEETS

The American Zinc Institute has announced today that its 36th Annual Meeting will be held at the Hotel Statler, St. Louis, Missouri, on Tuesday and Wednesday, April 20 and 21.

KUX

FIRST NAME IN DIE CASTING MACHINES





MODEL **HP-37** ILLUSTRATED

Hydraulically operated die casting machine for production of aluminum castings.

Battery of KUX Die Casting Machines in operation in the ultra-modern Maytag factory at Newton, Iowa

—helps make

Maytag

first name in washers

Since 1907, over 6 million Maytag Washers have been sold—far more than any other. The reason's clear; Maytag makes a wonderful washing machine . . . plus a full line of other home laundry equipment and famous Dutch Oven Ranges. It's logical that KUX, first name in die casting machines, should be used in the quality production of these superior products.

The use of KUX die casting equipment can put YOUR PRODUCT ahead—or *keep* it ahead. Reduce your manufacturing costs—increase the saleability of your product, with quality die castings made on these rugged machines.

Write for illustrated catalog showing complete line of KUX Die Casting Machines

KUX MACHINE COMPANY
6725 N. Ridge • Chicago 26, Illinois

KUX

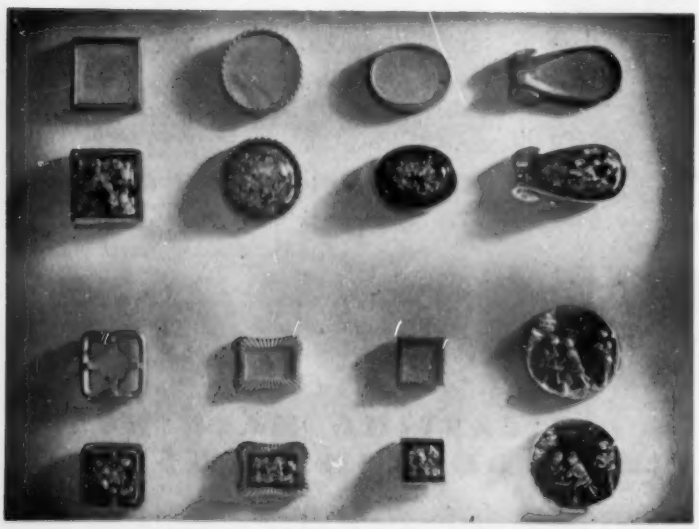
FIRST NAME IN DIE CASTING MACHINES SELECTED BY FIRST NAMES IN INDUSTRY

For additional information Circle No. 46 on the Reader Service Card

Short Run or Long Run?

Hickok designers can't tell until they're in production

SILVER INVESTMENT CASTINGS give deeper detail than can be obtained by die striking.



TIN-BASE CASTINGS in rubber molds also give deep detail in lower price items. They are silver plated.

FEW manufacturers have to introduce between 100 and 200 new designs each year. Yet Hickok Manufacturing Company of Rochester, N. Y. has been doing it successfully for many years.

This company, a leading producer of men's belts, cuff links and other costume accessories, regularly solves the complex design, production and inventory problems growing out of the need to create as many as 200 new models each year.

This multiplicity of designs is complicated by the difficulty of estimating quantities of each that will be required, since this depends largely upon the unpredictable buying whims of the public. Thus, these items have to be tooled as inexpensively as possible so that tooling can be amortised over the smallest likely quantity, and yet must be efficient enough to permit large volume output to meet large sales.

The majority of this company's detailed, small pieces, are produced by die striking in the company's large battery of presses, but two types of decorative pieces are investment cast or centrifugally cast in rubber molds.

Illustrations of each of these two types of castings are offered above. When silver is to be the material from which the castings are to be produced, investment casting techniques are used. For a less expensive line of items, tin base alloys are cast in rubber

continued next page

molds and then are silver plated.

The investment castings are obtained from an outside vendor, while the centrifugal castings are produced in the Hickok plant. A photograph of the rubber mold casting operation shows the type of mold, the arrangement of castings on the gate, and the equipment being used.

Each of these processes is distinguished by relatively low tooling cost, accuracy of detail and smooth surface finish of the castings. Each of these processes is adapted to short runs, but can also be utilized for longer production when needed.

The jewelry industry has utilized these two processes for many years in the production of delicately detailed pieces, but the large scale production which is characteristic of Hickok's products suggests

continued on page 84

Centrifugal Casting in Rubber Molds

TELEVISION SYSTEMS

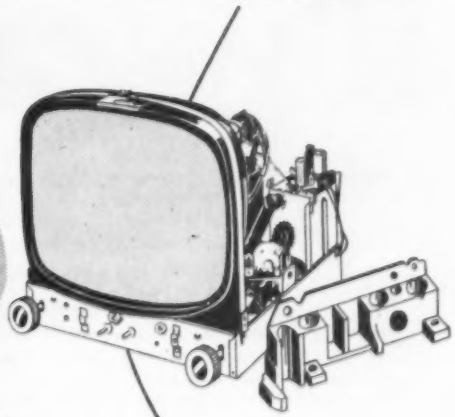
demand

ZINC DIE CASTING ALLOYS

for . . .

Unfailing

Dependability



ZINC DIE CAST CHASSIS INSURE EFFICIENT OPERATION

Thanks to the die casting process, efficient operation, smart appearance, lower production cost and adequate strength are achieved for television sets, zinc microphones, grilles, housings and other pieces of communication equipment. Polished and chrome plated, their beauty is unexcelled — yet, because of their strength and dimensional stability, these castings meet the most rigid mechanical requirements.

Our full staff of metallurgical and foundry engineers is available for consultation to help solve any problems you may encounter in the die casting of zinc, aluminum and brass. This service is offered without cost or obligation.

Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys

R. LAVIN & SONS, INC.

• Producers of Zinc Base Die Casting Alloys
• Refiners of Brass, Bronze and Aluminum

3426 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS, INC. 1900 54 Years 1954 SERVING THE FOUNDRY INDUSTRY

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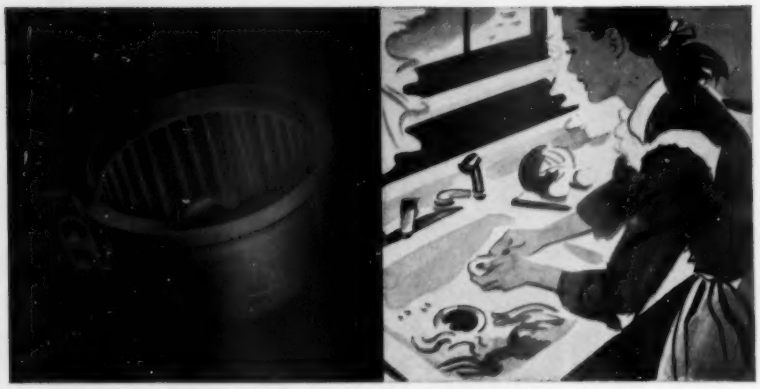

Garbage Disposers and Buses

Thompson Precision-Engineers Light Metal Castings for All Industry

A HOUSEWIFE using her garbage disposer unit and a bus driver threading his way through traffic have one thing in common—both count on Thompson. The garbage disposer unit and the bus are each improved by precision-engineered castings made by Thompson's versatile Light Metals Division.

The housewife's garbage disposer uses several parts manufactured by Thompson, including the housing—the bus uses several precision-engineered parts, including pistons.

Garbage disposer housings and bus engine pistons are but two of the many light, strong, durable castings designed, developed and manufactured by Thompson for a long list of diversified customer uses. Today Thompson is producing light metal castings for such products as washing machines and jet planes, outboard motors and tractors, automobiles and industrial engines; ice scoops and aircraft engines.

Behind this ability to aid all forms of industry are over 50 years experience in research and manufacture of precision metal parts. Regardless of your product, if you use castings, Thompson's creative engineers will gladly show you where and how you can simplify your operations and save on costs with Thompson Light Metals Castings.

For a detailed description of the Thompson Light Metals facilities which are available to you, send for your free copy of "Creative Castings." Just write to Dept. P-7, Light Metals Division, Thompson Products, Inc., 2269 Ashland Road, Cleveland 3, Ohio.

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PRECISION PROFIT-SHARING FUND AT AN ALL TIME HIGH

The profit-sharing and retirement trust fund established for the employees of the Precision Castings Co., Inc., Syracuse, N. Y., reached an all-time high of $1,350,000 for the fiscal year 1953.

This announcement was made by William J. During, newly elected president, at a ceremony held recently for the distribution of profit sharing and retirement fund books, where Mr. During explained the operation of the plan to the 994 participating employees.

Approximately one-third of the company's 3,000 employees are sharing in the benefits of the fund, since its inauguration in 1948, over $70,000 has been paid out for deaths, retirements and other terminations of employment.

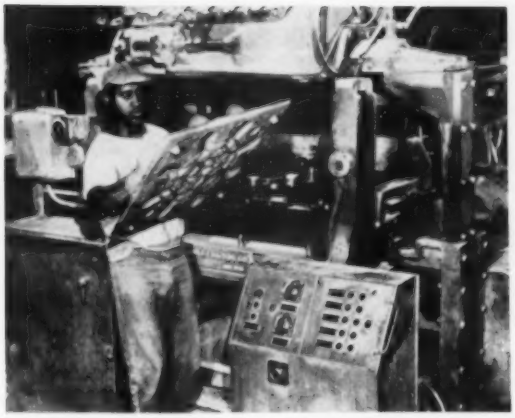
The company's life insurance plan has in force $5,521,500 with a cash value of $386,034. Insurance benefits paid out of this fund so far amount to $258,000.

The Precision Castings Company and its subsidiaries operate plants at Syracuse, Fayetteville, and Cortland, New York, as well as at Kalamazoo, Michigan, Chicago, Illinois and Cleveland, Ohio.

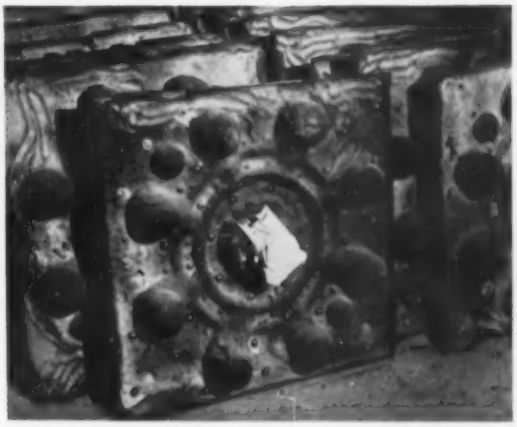
JACK PALMER JOINS S. U. S. AS MANAGER

John P. Sikorski, vice president and general manager of the S. U. S. Die Casting Company, Logansport, Indiana, has announced the appointment of Jack Palmer as works manager in charge of production and engineering.

Mr. Palmer is widely known in die casting circles, having most recently been plant manager and chief engineer for Cast Master, Inc., of Cleveland, Ohio.

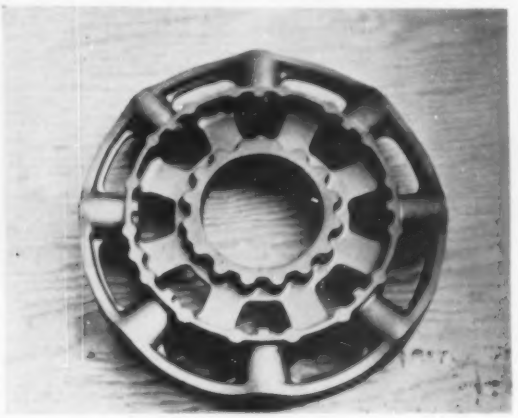


MIXTURE OF SAND and a Bakelite phenolic resin forms a thin layer on a heated pattern of the piece to be cast. More heat cures the resin which bonds the sand grains together to form a thin, light-weight mold.



COMPARATIVELY SMALL space is required for storing the molds until needed. Porosity of these shells helps to produce gas-free metal. Excellent castings have been made from test molds stored as long as two years.

BEFORE CASTING, the two mold halves are fastened together by bolting. They are then laid flat on a bed of sand for the molten metal to be poured into the center of the mold.



FINISHED CASTING weighs about 37 pounds and is cast in a stainless steel alloy. Other metals being cast on a production basis include aluminum, bronze and cast iron.

High Vibration Calls For Sound Castings

ONE HUNDRED percent X-ray inspection of these shell mold cast stainless steel support rings for jet engines show a much higher percentage of sound castings than is possible with sand castings.

The high vibrational stress of a modern jet engine would cause failure of this part if internal soundness were not present. According to Cooper Alloy Foundry who produce these rings, this high quality could not be achieved by sand casting methods.

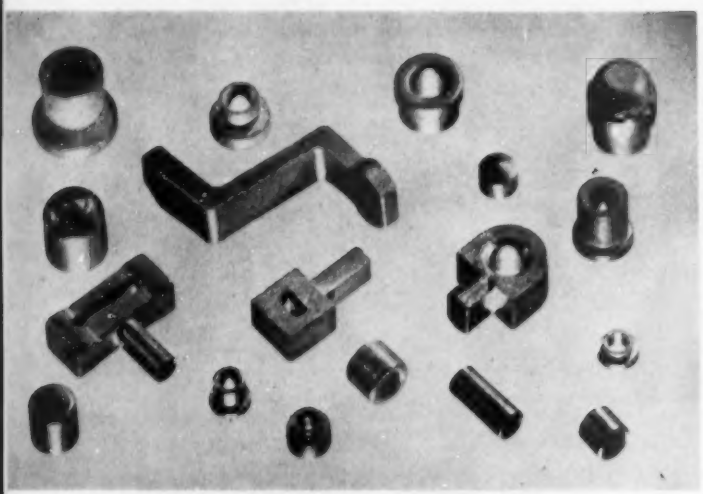
In addition, shell mold process makes it possible to: 1) cast closer to size, 2) reduce the amount of metal removed in machining, and 3) reduce finishing costs.

Molds halves can be made at different times with automatic machinery and can be handled and stored quite easily. Test molds have been stored successfully as long as two years. Photos illustrate the process.

How a manufacturer of displacement type gas meters gained improved product operation, simpler maintenance, and lower production cost is the subject of this report on . . .

Precision Parts Sintered In Gas-Fired Furnace

BY ROBERT O. BORDEN, Manager,
Erie Factory, American Meter Co., Inc., Erie, Pa.



1. SINTERED BUSHINGS and machine parts that have replaced machined pieces are displayed above. Bronze alloy is used throughout.

2. CLOSE-UP of two of the many bearing locations in these gas meters illustrates where the self-lubricating bearings are bringing great economy.

TO improve dependability and insure sustained accuracy of the displacement gas meters produced by the American Meter Company in Erie, Pennsylvania, machined bearings were replaced by sintered bronze, oil impregnated bushings. This changeover was accomplished after considerable experimentation on a number of powdered metal alloys and mixtures. Exhaustive tests resulted in a bronze type alloy consisting of approximately 90% copper, 10% tin. Zinc stearate is used as a lubricant in the compacting.

To date 19 parts are replaced by this sintered bronze alloy. The majority are bearing parts or bushings, Figure 1, situated at points where friction is encountered during the recording of air or gas flow through the meter. This friction loss has to be at an absolute minimum if the flow of all gas is to be recorded ac-

curately and smoothly. To accomplish this, the parts must operate smoothly, withstanding considerable wear under severe duty, and also be able to resist corrosion under all conditions.

In addition to excellent, permanent lubricating qualities, when initially impregnated with oil, the physical characteristics of this alloy more than meet service requirements.

The experience of other manufacturers on changeovers to sintered parts, for comparable applications, indicated that production costs per part would be considerably lower. This was more than verified under actual production conditions at American Meter.

Screw Machine vs Powder

A good example would be one of the bushings that had been previously turned and bored from brass bar stock on an automatic screw machine. Production averaged about 230 pieces per hour by this method with rejects often as high as 50 percent due to dimensional inaccuracies.

The same part, of sintered bronze powder, is now being turned out at a rate of 4000 per hour by the briquetting press and 12,000 per hour by the furnace, under full production, with practically no rejects. The obvious savings on this single part alone are considerable.

To carry out the sintering operation on a production basis, a Surface Combustion Corp. gas-fired muffle furnace with cooling chamber, Figure 3 and an MAX ammonia dissociating generator were purchased. The generator produces a prepared atmosphere that surrounds the work being heated and cooled in the furnace muffle.

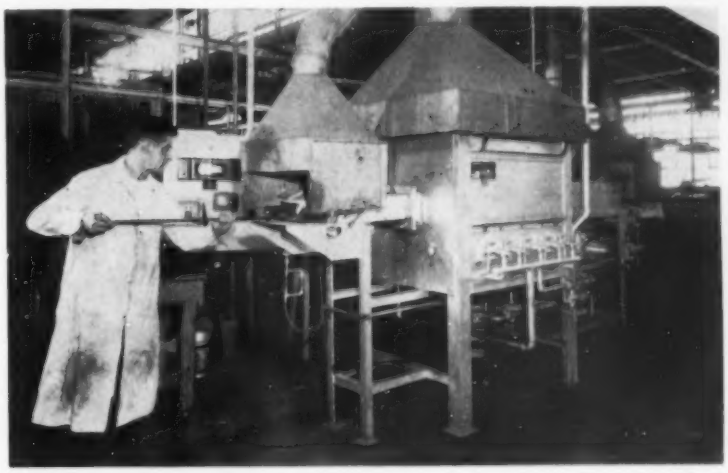
The furnace, generator, mixing drums, compacting and coining or sizing presses, oil impregnating equipment and other sintering facilities are located in an enclosed area. The furnace and generator are centrally located with the mixing drums and presses, positioned around it in order of their steps in the production process from mixing to oil impregnating. This arrangement confines these precision operations to a small area where all steps can be kept under close control.

Steps in sintering parts of bronze powder are outlined in Table I including operations and equipment.

Mixing of the powders has to be precise and accurate. It is carried out in a drum type tumbler containing a free turning cylindrical screen. After 10 minutes the screen is removed and the mixture is agitated under drying lamps for one hour.

Briquettes are formed by matching dies in a four-ton mechanical press. Powder is measured automatically from a

continued next page



3. VIEW of the Surface Combustion gas-fired muffle furnace with cooling chamber and MAX ammonia dissociator. Operator is pushing one of the coated trays into the charge vestibule.

TABLE 1

Operations in Sintering Bronze

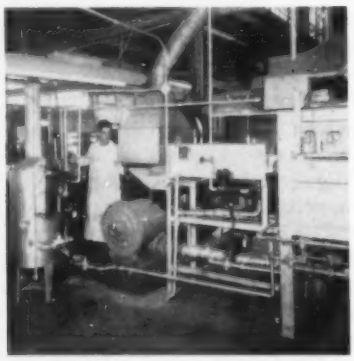
Step	Operation	Equipment
1	Mix powder	Tumbling drums (1 hour)
2	Press form briquette or compact	Mechanical press (4 ton)
3	Sinter and cool	Gas fired muffle fce. (1550F 50 Min. from charge to discharge)
4	Size and coin	Mechanical press (4 ton)
5	Impregnate with oil	Oil bath (170F for 2-3 hours)
6	Press fit	Oil hydraulic or mechanical press

Sintering With Gas – cont.

hopper and briquettes pressed out at a rapid rate. One of the briquettes, measuring .173 inches thick and requiring about 49-52 centigrams of powder, is turned out at a rate of 4000 per hour. The rate and amount of powder will vary according to depth and diameter of the part. Several sets of dies are still turning out good work after a million and a half briquettes.

Sintering is carried out at 1550F in the gas-fired muffle furnace. For the majority of production, exactly 1000 parts are loaded on each stainless steel tray measuring 11½ x 12 inches. Some of the 9 different types of parts that are sintered, will vary from 700-1500 per tray depending on size. A counting device on the briquetting press insures accurate loading of each tray. The parts must not overlap but lay flat in a single layer. Net weight of each load will range from one pound to 13 lbs. per 1000 parts.

All sintering operations to date, on the 90-10 bronze alloy, require a 5-minute loading interval. Loaded trays are brought directly from the briquetting press and stocked at one side of the furnace charge vestibule. A tray is placed on the small charge table and pushed into the vestibule every five minutes. A timer and bell, on the handy central control panel, signals these intervals. After pushing in a tray load, the operator resets



4. OPERATOR WITHDRAWING loaded tray from water-jacketed cooling chamber. Parts are cool enough to handle. Note MAX atmosphere generator in background.

the timer and proceeds to the discharge end of the furnace where he withdraws the last tray in line inside the water jacketed cooling chamber, Figure 4.

Since 10 trays can be accommodated in the furnace between charge and discharge doors, each tray load remains in the furnace and cooling zone for 50 minutes using the five-minute push cycle. They move through the furnace in

continued on page 100

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Precision-made to reduce your finishing and assembly time

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Finishing Section

SURFACE FINISHING

Most precision metal molded parts receive some type of surface finish such as plating, organic coating, anodic coating, or chemical coating. This section includes information on the methods, processes and equipment used in these surface treatments.

A Section Devoted to Specialized Finishing of

Die Castings • Investment Castings • Powder Metal Parts
Permanent Mold Castings • Plaster Mold Castings

CHEMICALS ACP PROCESSES

PHOSPHATE COATINGS TO MAKE YOUR PRODUCT DURABLE*

PIONEERING RESEARCH AND DEVELOPMENT SINCE 1914

For more than a third of a century, ACP research chemists and ACP technical representatives in the field have pioneered in the science of metal preservation. They have developed surface treating chemicals which either protect metals directly, or create a superior bond for decorative and protective paint finishes, and now, ACP chemicals and processes are being used the world around to reduce costs, speed production and add to the life-span of countless products.

ACP metal protective chemicals include: protective coating chemicals for steel, zinc and aluminum; metal cleaners and rust removers; final rinse controls; pickling acid inhibitors; copper coating chemicals; soldering fluxes; alkali cleaners and addition agents; copper stripping and brightening solutions.

PAINT BONDING

"GRANODINE"® zinc phosphate coatings improve paint adhesion on automobiles, refrigerators, projectiles, rockets, and many other steel and iron fabricated units or components.

"LITHOFORM"® zinc phosphate coatings, make paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE"® protective coatings provide improved paint adhesion and high corrosion-resistance for aircraft and aircraft parts, awnings, wall tile, signs, bazookas, and many other products made of aluminum.

RUST PROOFING

"PERMADINE"® zinc phosphate coatings provide rust and corrosion proofing for nuts, bolts, screws, hardware, tools, guns, cartridge clips, and many other industrial and ordnance items.

PROTECTION FOR FRICTION SURFACES

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A NEW Tool, Produced by Electroforming Pure Nickel Over Accurately Machined Surfaces, Gives Designers, Buyers, Inspectors and Machinists a Way To . . .

MEASURE SURFACE ROUGHNESS

Buyer or . . .

. . . Designer

SURFACE roughness specifications have come into increasing use during recent years. Designers and inspectors have been more and more concerned with accurate limits of acceptability for microfinish.

A tool newly introduced for the purpose of establishing controlling and checking microfinish on metal parts is the S22 microfinish comparator manufactured by Baptist Machine Co. of Stamford, Conn.

This comparator, produced by electroforming of pure nickel, does not corrode, gives a series of flat surface specimens for visual and tactual comparison, and is based upon standards set up by SAE and ASTM[1].

The 22 physical specimens of surface roughness and lay are listed in Table 1.

Surfaces in the scale are accurate reproductions of accurately machined surfaces measured in microinches, identified by the average deviation from the mean surface, expressed in microinches.

The S22 comparator is made in the following manner:

1. Individual specimen blocks are accurately machined from stainless steel to the specified standard finishes.

2. These blocks become master patterns against which nickel electroforms are made. The result is the negative sur-

TABLE 1
PHYSICAL SPECIMENS OF SURFACE ROUGHNESS AND LAY

Type of Surface	Roughness Height **(Microinches)	Lay	Roughness Width (Inches)	Actual Values Measured by*
HONED, LAPPED, OR POLISHED	2 4 8	Parallel to long dimension of specimen		2.4 — B 3.8 — B 6.5 — B
GROUND WITH PERIPHERY OF WHEEL	8 16 32 63	Parallel to long dimension of specimen		7.8 — B 14. — B 28. — B 64. — B
GROUND WITH FLAT SIDE OF WHEEL (Blanchard)	16 32	Angular in both directions		17. — B 28. — B
SHAPED OR TURNED	32 63 125 250 500	Parallel to long dimension of specimen	0.002 0.005 0.010 0.020 0.030	31. — B 60. — P 130. — P 250. — P 530. — P
SIDE MILLED, END MILLED OR PROFILED	63 125	Circular	0.010 0.020	57. — P 125. — P
	250 500	Angular in both directions	0.100 0.190	235. — P 470. — P
MILLED WITH PERIPHERY OF CUTTER	63 125 250 500	Parallel to short dimension of specimen	0.050 0.075 0.125 0.250	55. — P 115. — P 240. — P 520. — P

*Measured by: B—Brush Analyzer; P — Profilometer.

**Average deviation from the mean surface.

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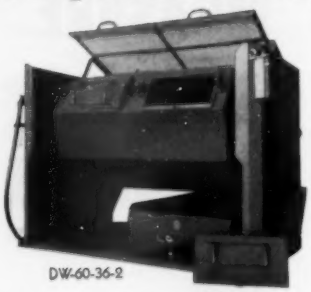
put your precision finishing on a mass production basis

SAVE MANHOURS AND MONEY . . . the original Roto-Finish processes completely eliminate hand finishing in most instances. GET ABSOLUTE UNIFORMITY . . . in any quantity. MAINTAIN exact tolerance on precision parts. CUT FINISHING costs as much as 80% . . . this fact has been proved many times in actual installations. LOWER INITIAL AND MAINTENANCE costs . . . you need only one Roto-Finish machine to replace several manual grinding or polishing machines. No exhaust system is ever required.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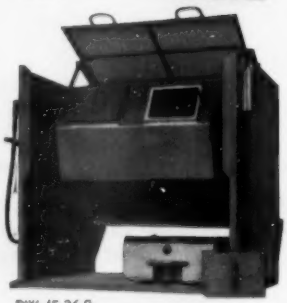
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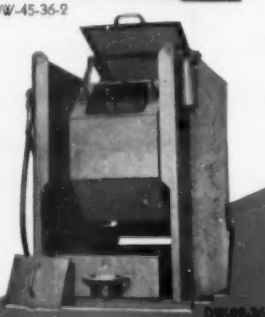
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Send a few unfinished parts to us . . . plus a finished part for a guide, (or we'll be glad to pick them up from your plant) for a "no charge" demonstration. Then sit back and let us *prove* that Roto-Finish will finish your parts . . . to your specifications . . . and save you time and money. We *guarantee* that you can get the same results in your plant that we produce in our laboratory. *There is no obligation for this service.*

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ORIGINATORS OF THE ROTO-FINISH PROCESS

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face of the machined blocks.

3. The negative impression is then used as a production pattern for electroforming the nickel deposit which, upon separation, is the accurate reproduction of the original master.

Two uses which manufacturers of precision metal castings and other types of closely controlled metal parts find for a surface comparator are illustrated. They are also being used to coordinate buying, to help in the machine shop, and to supply standards of comparison which may be used by both manufacturer and vendor.

Details are published in American Standard, Physical Specimens of Surface Roughness and Lay — ASA-B46.2 — 1952, sponsored by SAE and ASTM.

CONFORMING MATRIX WEST COAST OFFICE

Hamilton E. MacArthur, president of Conforming Matrix Corporation, has announced the opening of a West Coast branch, 38 LaPorte St. Arcadia, Calif.

Jack M. Nims, a native Californian, identified with the sales and engineering phases of the plastics industry for the past ten years, has been appointed West Coast manager. Mr. Nims also has a wide background of experience in paint chemistry.

OPENS CLEVELAND OFFICE

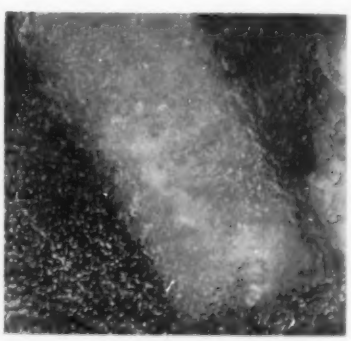
National Research Corp. has opened a sales office in Cleveland, it has been announced by Walter G. Overacker, sales manager of the equipment division.

Representing the company in the Cleveland area will be George A. Goetz, who has been with National Research almost two years. Office will be at 4205 Chester Ave.

It works like this:

MAN-MADE ceramic transducer, heart of the Detrex ultrasonic cleaning process, converts electric energy to acoustical energy of high intensity, and . . .

FOCUSES IT on work surface to be cleaned. Here is a jet engine blade having all foreign matter literally "exploded" away by ultrasonic waves as . . .



SHOWN IN CLOSE-UP here. Extreme agitation in the trichlorethylene bath is removing iron oxide paste used for Magnaflux, but also removes other hard-to-clean materials such as buffing compound.

If you're finishing . . .

. . . large volume, small parts

. . . intricately shaped parts

give some thought to this new process:

Ultrasonic Cleaning

What It Is: Application of ultrasonic energy for agitating action in combination with the correct solvent degreasing cycle, is one of the newer methods of cleaning soil from metal suraces. According to Detrex Corp., who produce equipment for this process, it achieves a cleaning action unobtainable previously except by manual wiping.

In general terms, the process literally knocks the soil from the surface by focusing sound energy, above the audible range of 20,000 cycles, upon the workpiece as it is suspended in a bath of appropriate solvent.

How It Works: Ultrasonic energy is beamed at the piece to be cleaned. Source of this energy is a barium titanate transducer, which converts electric energy to sound energy and, by virtue of its curved cross-section, focuses this energy into the center of an arc.

In the Detrex Soniclean process, the transducer is submerged in the trichlorethylene degreasing solvent at an operating temperature of 140F. With an input of 20 to 30 watts per square inch, the barium titanate transducer produces an acoustical intensity in the focal region in the order of 13,000 watts per square inch, which is said to be about 80 times greater than is obtainable from a quartz transducer.

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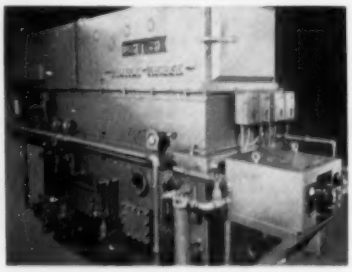
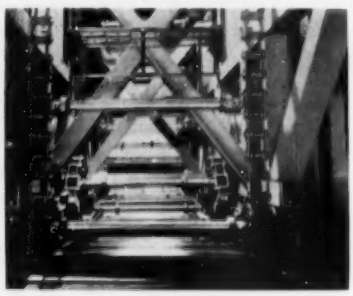
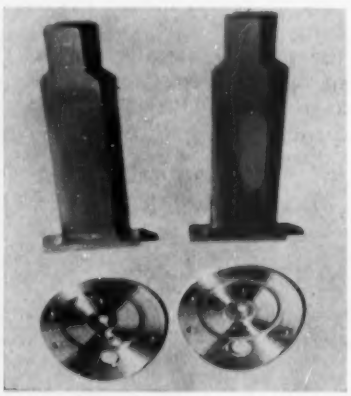
This is the machine:



NOW PRACTICAL as a production line method, ultrasonic cleaning can be obtained with this Detrex Soniclean machine . . .



INSIDE of which is shown here as it conveys 50 electric shaver heads at the Electric Shaver Division of Remington Rand, Inc. Removable trays have been designed for easy handling.



BEFORE AND AFTER view of two metal parts that have been cleaned ultrasonically are displayed here.

Buffing Compounds and Other Hard-To-Remove Soils Can Be Cleaned from Metal

ULTRASONIC CLEANING — cont.

In explaining the acoustical energy developed by these barium titanate transducers, a Detrex engineer has pointed out that the amount of energy emitted from this ceramic is 100 million times that of an ordinary radio or television loudspeaker.

The metal parts to be cleaned are moved through the trichlorethylene solution during which the high energy is directed at surfaces to be cleaned. In the Detrex machine, cross rod conveyorized or monorail units, provide in excess of 120 work carriers per hour. Trays of work as large as 10″ x 10″ and clean work up to 3″ in heght.

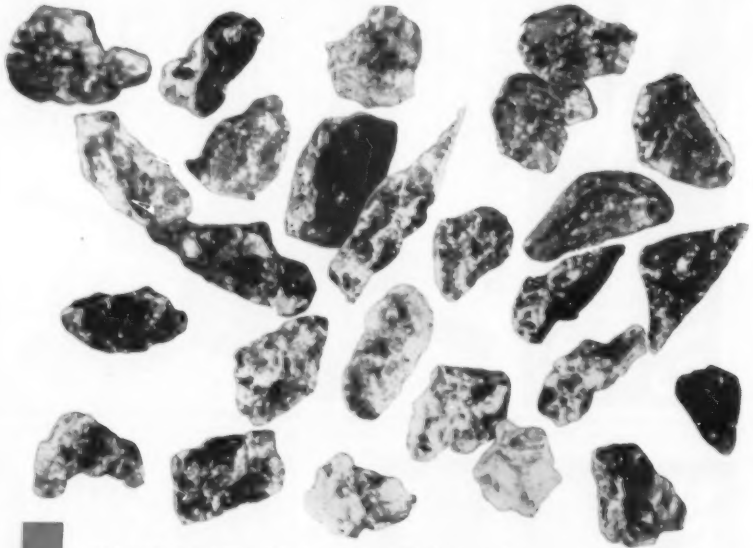
After passing through the ultrasonic cleaning bath, the parts then move into a solvent distillate rinse, a final vapor rinse, and drying.

What Can Be Cleaned: This ultrasonic cleaning process can be applied to nonabsorbent materials such as metals, glassware and molded products. Many hand wiping or brushing operations can be eliminated because it quickly removes soil from cavities, shallow identations, small holes and precision finished surfaces.

The jet engine blade, illustrated, is an example of the size and type of part which can economically be processed with present equipment. It is characteristic of a large range of small die cast and investment cast pieces now cleaned by other methods.

Even difficult soils, such as buffing, lapping and honing compounds, are reported to be removed easily. Iron oxide residues, such as those left after Magnaflux, are removed to a degree not previously possible.

Use the POLISHING GRAIN engineered for the job!



ALOXITE® Aluminum Oxide and CARBORUNDUM® Silicon Carbide Polishing Grains are not just "made"... they are *engineered* with as much skill and care as any production tool. To speed your polishing operation, grain structure is controlled to provide the largest possible number of cutting edges per grain. To give you maximum production from each wheel or belt you set up, grain temper and toughness is controlled—chemically and physically. To insure dependably uniform finishes time after time, they are accurately graded. Special treatments on the grain surfaces make sure your glue or cold cement holds these cutting tools securely.

Let CARBORUNDUM's Engineering Service help answer *your* polishing problems...with the selection of the right grain for your specific jobs. This service is yours without obligation—through your CARBORUNDUM Distributor or Salesman. Its sole function is to help you achieve maximum production at the most reasonable cost.

CALL YOUR CARBORUNDUM Distributor or Salesman (listed in the yellow pages under "Abrasives" or "Grinding Wheels"). He'll see that you get expert counsel...and follow through with prompt delivery from complete stocks. Or write to The Carborundum Company, Dept. PM 83-41, Niagara Falls, N. Y.

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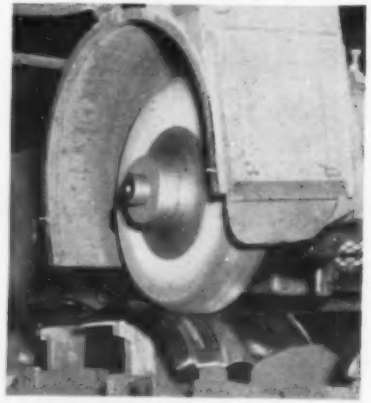
Polishing steel.

Pre-plating polish for high lustre.



Polishing on automatic machines.

CARBORUNDUM

REGISTERED TRADE MARK

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Headquarters for

ALMCO Supersheen SPEED FINISHING

BARREL FINISHING COMPOUNDS

40 DIFFERENT COMPOUNDS

A tremendous selection of compounds—making it possible to choose one that can give superior results for a given job.

Also—special compounds developed as custom items to meet specific job requirements.

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AMERICA'S LARGEST MANUFACTURER OF ADVANCED BARREL FINISHING EQUIPMENT—MATERIALS AND COMPOUNDS

ALBERT LEA, MINNESOTA

Ultrasonic Machine Tool to be Sold by Sheffield

The Sheffield Corporation of Dayton, Ohio, will henceforth design, manufacture and market Cavitron machine tools, according to a joint announcement by the Cavitron Corporation, Long Island City, New York, and Sheffield. In addition to Sheffield's exclusive distribution rights for the United States and Canada, both concerns will join in marketing the machines abroad.

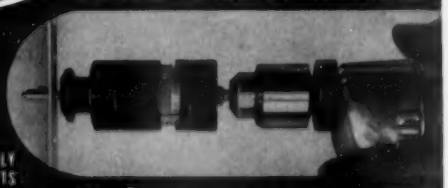
The agreement provides that the Cavitron Corporation will continue to produce the ultrasonic transducers and generators, being the originators of the ultrasonic mahcining process and holders of the basic patent rights, and will issue licenses for the process through Sheffield.

The Cavitron machine tool utilizes an ultrasonic vibrating head and an inexpensive tool (such as soft steel) for the precision cutting of hard and brittle materials, either ferrous or non-ferrous, such as the carbides, germanium, hardened tool steels, sintered aluminum oxide, quartz, industrial crystals, ferrites, various types of glass, ceramics, and other materials difficult to machine.

It may be used for extremely precise external or internal machining similar to cutting, drilling and grinding of holes, cavities, slots and recesses of any shape, as well as precision forming of external profiles, Extremely fine surface finish is obtained, and there is no local heating of the work surface or chemical or physical change in the work piece.

The Cavitron machine tool is unique in its unbelievably high cutting speeds and precision. The operation is accomplished by the use of an ultrasonic tool head vibrating from 18,000 to 30,000 cycles per second.

NOW AUTOMATIC Hole DEBURRING



AUTOMATICALLY DEBURRS PARTS LIKE THESE!

with NOBURMATIC TOOL

New Noburmatics deburr and chamfer front and inaccessible back hole faces in ferrous and non-ferrous sheets, plates, extrusions, castings and forgings ***in one automatic operation.*** Used in drill motors or stationary machine tools, Noburmatics produce uniform deburring with high accuracy, increase production line speed. Made in all drill sizes from 1/8" (.125) to F(.256).

Entry Noburmatic enters hole, advances to limit stop, DEBURRS FRONT FACE. (Rear cutter now projects.)

Withdrawal BACK FACE DEBURRED. Cutter automatically retracts. Tool ready for next cycle.

For Free Bulletin and Full Details, Write Today!

NOBUR MANUFACTURING COMPANY
717 N. VICTORY BLVD., BURBANK, CALIF

See us at A.S.T.E. Exposition, Philadelphia, Booth 1972
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CUT... OPERATING — MAINTENANCE — SPOILAGE COSTS!

ON YOUR TAPPING JOBS!

NEW "TRU-GRIP" TAP HOLDER

Procunier Safety Chuck Company
14-16 S. Clinton St., Chicago 6, Ill.

Procunier Tappers are the last word in economical, efficient, high speed tapping. Only Procunier has the unique construction features that permit inexperienced operators to tap like experts. Procunier Tappers provide many extra hours of continuous accurate tapping without frequent "down-time" interruptions. Procunier Tappers are producing more—with fewer rejections, fewer spoiled pieces and a minimum of broken taps.

Only Procunier provides: new sensitive double cone friction clutch; soft cushioned action driving pressure; ballbearing equipped; heat treated gears; special balanced gear reversing mechanism; smaller-lighter more accurate tru-grip tap holder; and many other unusual features.

Write for FREE Brochure

Giving full particulars on the complete line of Procunier Tapping Machines. Learn how you can adapt them to your specific needs.

PROCUNIER SAFETY CHUCK CO.
14-16 S. Clinton St., Chicago 6, Ill.
Dept. 3

Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

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$22,500... Saved Each Year In Cleaning Dies

By blasting with non-metallic abrasives suspended in liquid, this company saves two hours cleaning time on each die casting and forging die.

PRECISION cleaning of casting and forging dies at Imperial Brass Manufacturing Company, Chicago, with a liquid blast unit is reported to save the company $22,500 per year in cleaning costs and increase die life 15 percent.

Imperial Brass, manufacturer of a quality line of brass fittings, nozzles, valves, strainers and related products, has the constant problem of removing scale and carbon deposits from its dies. The company formerly used slow hand methods to remove these deposits.

As a result of the speed of liquid blast cleaning, the company reports a minimum saving in cleaning time of two hours per average-size die and up to three hours for larger and more complicated dies.

Imperial Brass now cleans 25 to 30 dies per day. Small dies take only 5 to 10 minutes. The largest dies take from 15 to 20 minutes. One operator spends about 5 hours per day on this job.

The company figures its production savings in this manner: Using a conservative figure of 25 dies per day, the two hours saved per die amounts to a minimum labor saving per day of 50 hours. Using the Chicago area average rate of $1.50 per hour, this amounts to a saving of $75.00 per day. On the basis of a 300 work day year, Imperial Brass figures they save a minimum of $22,500 annually as a result of this installation.

Machine finishing with a Pangborn Hydro-Finish liquid blast unit which speeds the cleaning operation, increases die life and puts a smoother

continued next page

$22,500 SAVED — cont.

finish on die surfaces. This liquid blast machine cleans with a stream of suspended non-metallic abrasives. Abrasives are generallly in the talcum powder range and finer. Machines handle particle sizes from as coarse as 60 mesh to as fine as 5000 mesh equivalent.

How they do it . . .

Because this is a precision cleaning operation — it can hold tolerances to as close as .0001 — it cleans with a polishing rather than a gouging action and thus puts less wear on the die surfaces. Company records indicate a minimum increase of die life of 15 percent.

On die castings dies, when there is any tendency toward difficulty of removal from cavities, these dies are polished by the liquid abrasive stream. This also results in a much improved finish on the product because any imperfections appearing on the dies are removed before the dies are reused.

Other advantages reported by the company include the reduction of forging troubles, better quality products, no break down of sharp edges and corners and no change of tolances. For instance, whenever there is any tendency of forging dies to stick, Hydro-Finish is used to eliminate the trouble.

After dies are cleaned, they are coated with Pangborn rust proof oil and are then ready for further use with no hand polishing required. And because this liquid blast method cleans more evenly and with fewer irregularities, these forging and casting dies can be used longer between cleaning operations.

Good Barrel Finishing Costs Less with The Abbott Method

It's a fact! The Abbott Method of Barrel Finishing reduces costs because it features long-lived Abbott Burnishing Shapes. Made of selected carbon steel — deep hardened — tempered and polished to a mirror-like glass hard finish, Abbott Shapes make efficient contact on all sizes and designs of stampings and castings. Abbott Burnishing Shapes last longer, burnish more parts and cost less in the long run. Used in Abbott Vertical Barrels they make an unbeatable barrel finishing combination!

For Proven Performance . . . use The ABBOTT METHOD.

Improved Abbott Barrel!
Self-contained! Precision speed control!
Color dynamic! Write for details . . . quick!

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For additional information Circle No. 79 on the Reader Service Card

CARBORUNDUM ACQUIRES AMERICAN TRIPOLI CORP.

Agreement has been reached for The Carborundum Company to acquire the capital stock of American Tripoli Corporation of Seneca, Missouri, according to an announcement by General Clinton F. Robinson, president of Carborundum in Niagara Falls.

General Robinson said the American Tripoli Corporation owns deposits of and a plant for the production of "Seneca Standard" Tripoli, an unusual form of silica found in the foothills of the Ozark Mountains.

Marketed throughout the world, this strange non-metallic mineral is a unique form of silica which is double refracting and of the chalcedony variety. It is soft, porous, and has a fibrous structure, with no sharp edges or corners and average particle size of less thon .01 millimeter.

Applications include buffing and polishing compounds, lacquer finishing compounds. metal polishes, foundry parting, detergents, cleaners, polishing cloths, etc.

"The purchase of American Tripoli Corporation, closely related to the abrasive industry, is a further extension of Carborundum's policy of diversification into kindred product lines of the parent firm," Robinson said.

CONFORMING MATRIX WEST COAST OFFICE

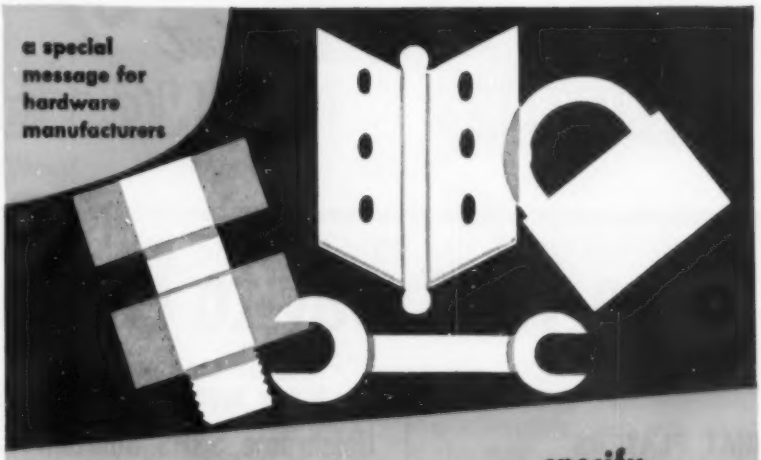
Hamilton E. MacArthur, president of Conforming Matrix Corporation, has announced the opening of a West Coast branch, 38 LaPorte St., Arcadia, Calif.

Jack M. Nims, a native Californian, identified with the sales and engineering phases of the plastics industry for the past ten years, has been appointed manager.

LEA HEAD DIES

Robert S. Leather

A LONG CAREER in the metal finishing industry came to an end with the sudden death of Robert S. Leather on January 18. Mr. Leather was founder and chairman of the board of The Lea Manufacturing Company, Waterbury, Conn. His death from heart attack occurred during a pleasure cruise in the Mediterranean. Mr. Leather had guided the Lea company from its beginnings, helping it grow from a small plant manufacturing finishing compounds, to a large organization with four manufacturing plants and worldwide distribution.



need a finish for protection—decoration—identification? specify IRIDITE®

Specify Iridite . . . for corrosion protection during storage or use . . . for a firm and lasting base for paint . . . for extra quality and eye-appeal . . . for low cost color coding of finished parts.

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

Iridite is approved under government specifications

ALLIED RESEARCH PRODUCTS
INCORPORATED
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Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals, ARP Plating Chemicals.
WEST COAST LICENSEE: L. H. Belcher Co.

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UNICHROME
Trade Mark

News about
COATINGS for METALS
Metallic . . . . . Organic . . . . . Decorative . . . . . Protective

The 1954 way to chromium plate

WHAT PLATERS LOOK FOR IN RECTIFIERS

All platers want a DC supply to be dependable, equipment durable, and capacity close to needs in order to avoid extra investment.

Designed specifically for platers, in a line unsurpassed for completeness, Unichrome Rectifiers permit virtually a "custom" rectifier installation. Included are standard units, plus-rated units, extra heavy duty units and water-cooled units—available in sizes from 250 to 10,000 amperes in 250 ampere steps and with various controls. Full data available.

What to look for in chromium plating anodes

Quality of chromium plating anodes can be gauged by several important factors.

First is composition of the anode. If it's tin-lead alloy, it better resists corrosive action of chromic acid during both idle and active periods.

Then check the bond between body and copper hooks. Best conductivity results when hooks are tinned, alloy cast to the hook, and anode body then fused on.

Finally, observe the hook. Does it assure good contact with a knife-edge wedge-type hook that cuts through encrustations on anode bars?

Providing users with all these advantages, Unichrome Anodes for chromium plating make for efficient service with unusual economy.

Tantalum coils reduce costs in acid plating baths

More and more plating plants are now reaping benefits from a metal that seems made to order for heating or cooling acid solutions. With Unichrome tantalum coils, they get equipment immune to all commonly used acid plating baths. The metal has high heat conductivity and resistance to thermal shock. Its corrosion resistance and hardness permit use of thin wall sections to further increase its good heat transfer.

Result: A smaller coil does a better job than bulkier coils made of other materials—and with a minimum of trouble and maintenance. This saves on replacement and loss of production during downtime. Write for literature.

UNITED CHROMIUM, INCORPORATED
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Chicago 4, Ill. • Los Angeles 13, Calif.
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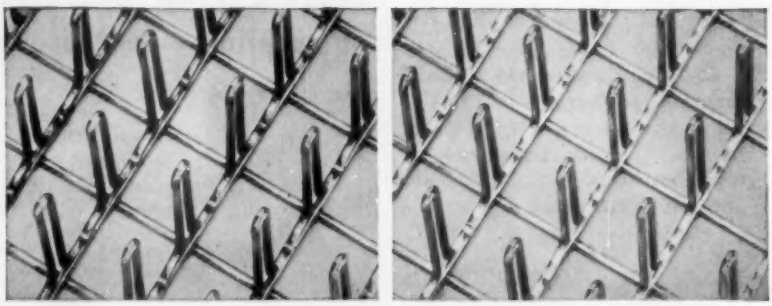
United Chromium Limited, Toronto, Ont.

Many former operating difficulties eliminated with Unichrome SRHS Solution . . . users verify various benefits



(Left): Photograph of dish drainer basket plated in ordinary chromium solution. Dark areas at base of wire fingers show no coverage of nickel.

(Right): Same product when plated in SRHS Chromium Solution. Note the even color at top and base of finger—evidence of complete coverage.

More than 700 commercial installations of the Unichrome SRHS Chromium Solution are now in operation. These have provided working demonstrations that ordinary chromium solutions, unchanged since development in 1925, are virtually obsolete.

Briefly, the striking improvements stem from several important characteristics of the SRHS bath. Namely, its higher cathode efficiencies; its self-regulation of important chemical constituents which helps maintain optimum plating balance; and its wider bright plate range. These have benefited platers in various ways. For example:

20% to 80% FASTER PLATING

With an SRHS Solution, one plater was able to speed up an automatic machine. Plating work in 2 minutes 25 seconds instead of 3 minutes 38 seconds, he not only increased the machine's capacity 33% but also improved quality by exceeding thickness specifications.

Another company needed additional tanks to handle increased production of plated cutlery. Just by using the SRHS Solution, existing capacity was stepped up and the expense of new equipment saved.

BETTER COVERAGE

Photographs above show wire baskets used in dishwashers. Ordinary chromium couldn't cover this complicated shape but the SRHS Solution plated the work completely.

The solution has wider bright plate range. SRHS Chromium, therefore, not only means less "missing" but also less "burning." Consequently, it assures fewer rejects.

MORE WORK WITH LESS CURRENT

Finishing automobile bumpers, one company could plate only 8 on a rack in the ordinary solution. Requiring less current, SRHS Chromium permitted plating 9 bumpers per rack – or an 11% increase in production with no change in equipment.

A plant plating cigarette lighters in the ordinary solution was behind schedule due to limited current. Switching to SRHS Chromium, they found it possible to plate the same work load with ⅓ less current and in ½ the time.

SELF REGULATION SIMPLIFIES PROCEDURE

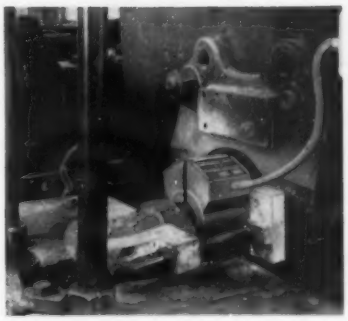
A printing company installed an SRHS Solution for chromium plating rotogravure cylinders. They had no previous chromium plating experience. Despite this lack, the SRHS Bath enabled them to plate 2800 cylinders with only 5 rejects.

★ ★ ★

With results like these, it no longer pays to work with a chromium solution of the "1925 vintage." Learn how to convert your plating operation without disrupting production. Detailed technical information available. Or call in a United Chromium engineer for complete facts.

For additional information Circle No. 95 on the Reader Service Card

New Products ... the Reader Service Cards will bring full details



HIGH CAPACITY NOZZLE HEATER
. . . for die casting machines

Nozzle problems that have confronted die casters can be solved by the use of a new electric nozzle heater, according to the manufacturer.

The heater is designed and built to exact physical dimensions of the nozzle and correct thermal loads governed by the total pounds per hour of output desired.

Installations have shown elimination of freezing of die casting metal in the nozzle at the end of the casting cycle; elimination of uncontrolled nozzle warping; and reduction of the tendency of the nozzle heater to over-heat the die.

These results, coupled with close temperature control by means of thermocouple controls, completely eliminate shut-downs due to nozzle difficulties and actually decrease the shot cycle sufficiently to pay for the equipment installation.

Thermel, Inc.
For more information circle No. 200 on the Reader Service Card

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STRIPPABLE COATING
. . . shows no oil exudation

For those applications where complete freedom from oil exudation up to 160F is needed a new strippable dip coating is now available.

The new coating, according to the manufacturer, can be used over the temperature range of −50F to 160F. It functions as a semi-permanent coating for metal objects, as a strippable coating for metal, as an insulating and potting compound for objects not subject to heat in excess of 160F and as a plating stop-off.

The new material offers excellent resistance to corrosion. Melting temperature is 360F in melting pot — application range is from 320 to 350F.

Fidelity Chemical Products Co.
For more information circle No. 197 on the Reader Service Card

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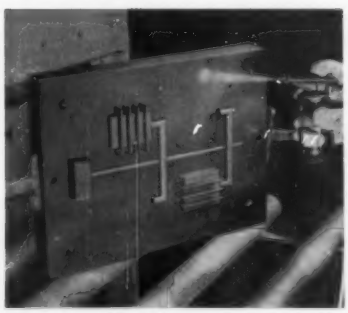


SHELL MOLD RELEASE
. . . with silicone base

Three new silicone release agents are said to make the removal of shell mold patterns easier and more efficient. Foundrymen can choose from an extremely stable emulsion stock, a ready-to-use solution, and a modified silicone for users who prefer to make up parting solutions in their own plant.

The LE-46 silicone parting emulsion is easily diluted for use by simply mixing with tap water in a clean container. It is said to provide four major advantages; 1) excellent pattern release, 2) low build-up on the pattern, 3) economy because of the low silicone concentrations and less frequent pattern cleaning needed and 4) freedom from emulsion breakdown.

Another agent LS-46 is recommended where even a small amount of pattern build-up

continued next page

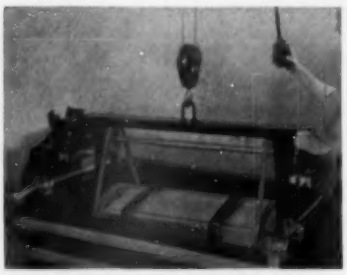
cannot be tolerated. Such build-up might result from using hard water with LE-46.

The third parting agent L-46 is used as a stock solution. The LS-46 is made up by using 5 percent of L-46 in a low aromatic hydrocarbon solvent.

Linde Air Products Co.
For more information circle No. 199 on the Reader Service Card

PLATING BARREL
. . . cuts maintenance costs

A newly designed plating barrel that is said to give the highest plating production of any commercially available unit and savings of up to 50 percent in maintenance man-



hours has recently been announced.

The usual transmission has been eliminated by suspending the barrel in the tank with two equal length V-belts running from the drive shaft to grooves in the ends of the barrel. This construction eliminates all shafts, bearings, gears, etc. The belts are made of acid, alkali, and stretch-resistant composition guaranteed 2000 lb. capacity and heat-resistant to over 200F.

Cathode contact is made by inverted V blocks on the ends of the superstructure. The manufacturers claim that this construction gives 16 inches more contact area than the next longest commercial unit on the market.

Another advantage claimed for the barrel unit is that it can be used in standard tanks so that the plater need not give up presently installed equipment to install the new barrels.

The G. S. Equipment Co.
For more information circle No. 201 on the Reader Service Card

ATMOSPHERE TEST UNIT
. . . for heat treat furnaces

A new, portable, visual unit for testing gases in either research or production departments of any plant using special atmospheres or heat treating furnaces, has been introduced. It can be applied to determine quality of gas being produced by an atmosphere generator or the atmosphere in a sintering furnace or other special atmosphere furnace.

For example, when carburizing, or doing other heat processing of high carbon parts, the unit will determine the carbon potential of the atmosphere produced by the gener-

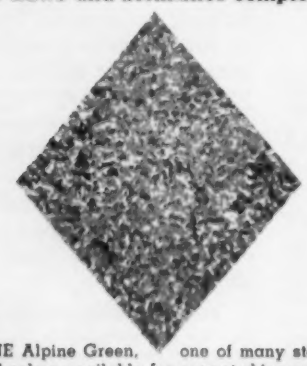
continued on page 76

THE MOST AMAZING FINISH DEVELOPMENT IN 100 YEARS!

COLOR-FLECKED PLEXTONE®

SINCE 1876 (Mfd. under U. S. Pat. No. 2581904)

Imagine—a textured and MULTI-COLORED finish—sprayed at ONE time, from ONE gun, in ONE coat that covers surface flaws and blemishes completely!



PLEXTONE Alpine Green, one of many standard pre-mixed colors available for prompt shipment. Also available in solid colors and in custom multicolors.

CAPSULE FACTS

COLOR-FLECKED PLEXTONE is a new industrial finish in which colors exist separately until sprayed, when they interlace as shown above.

CHARACTERISTICS

Lacquer base • Air dries approx. 30 minutes — dries hard 2 to 3 hours • Available in flat or semi-gloss • Good chemical resistance • Exceptional hiding power • Does not stain • Resists wear, chipping, cracking • Can be scrubbed, even scoured • Can be touched up without showing • Thicker film hides surface imperfections, covers porous materials • Available in non-toxic grades • Bonds readily to wood, wallboard, paper, cement, plaster, phenolic impregnated papier-mache forms, plastics, woven fabrics, and metals such as cast iron, steel, aluminum, brass, copper.

PLEXTONE—CUTS FINISHING COSTS UP TO 35%
Eliminates much costly pre-finishing, hides surface flaws. Usually only one prime, one PLEXTONE coat required!

PLEXTONE — UNBELIEVABLY RUGGED!
Color flecks go "thru-the-film," resist abuse, defy alcohol, grease, oil. Can be washed, scoured, without damage!

PLEXTONE — SALES APPEAL OF *MULTICOLOR!*
Endless new effects of 2, 3 or more colors sprayed from one gun, at one time . . . tone-on-tone, spatter-dash, etc., etc.

PROVE IT TO YOURSELF—MAIL COUPON TODAY

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MAAS AND WALDSTEIN CO. PLEXTONE Division
2118 McCarter Highway, Newark 4, New Jersey
Gentlemen: Please send me FREE color chips, PLEXTONE sample, and application data.
I am particularly interested in PLEXTONE for finishing

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

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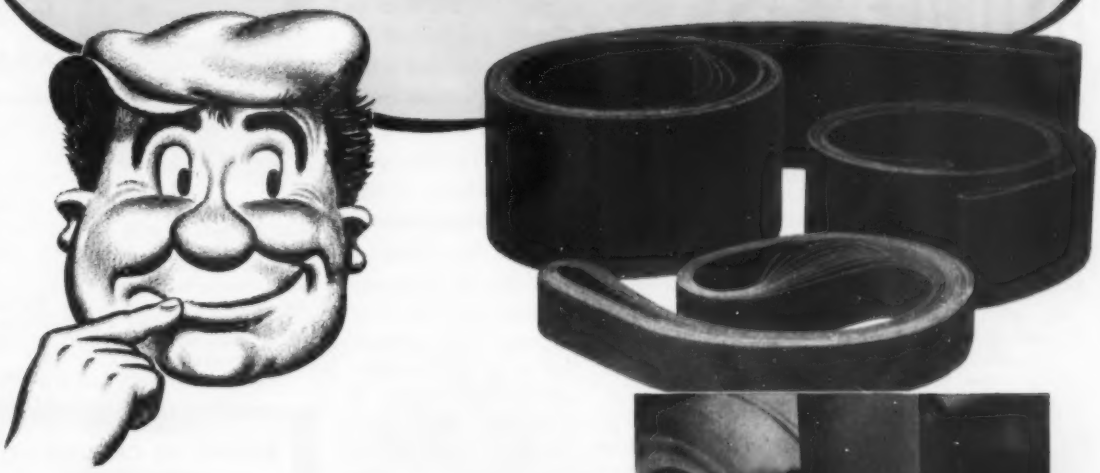
Which Behr-Manning abrasive belt is best for your polishing job?



You can slash contour and flat polishing costs – and get a better finish too – when you use the *right* BEHR-MANNING® coated abrasive belt *and* finishing method. You have a wide selection to choose from. For example:

RESINALL® METALITE® Belts, made with a double bond of thermo-setting resins, resists the heat of heavy duty grinding.

RESINIZED® METALITE gives you a resin sized belt for "high-heat" operations in finer grits.

SPEED-WET® METALITE for the real tough jobs with high-speed requirements. Generally used with a coolant for maximum rate of cut.

LIGHTNING® METALITE Cloth Belts for contour polishing and "oiling out."

METALITE X-WT. Belts for flat surfaces, slight contours and where extreme belt flexing is not required.

USE THE ASSISTANCE OF THE BEHR-MANNING FIELD ENGINEER in making your selection. His training and experience will be invaluable in deciding on, not only the right belt, but also the correct grit size, backing and application method. By actual test, in your own plant or in a nearby BEHR-MANNING Demonstration Room, the most efficient combination for your need can be worked out. Make a date now. Write Behr-Manning Corp., Troy, N. Y., Dept. PR-3.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U. S. A.

Contour grinding with BEHR-MANNING abrasive belt and a shaped contact wheel.

Polishing inside contours of small parts with a narrow belt running over a "finger" while part is moved in an arc.

BEHR-MANNING® CORPORATION division of NORTON Company

P-2

▲ COATED ABRASIVES ▲ SHARPENING STONES ▲ PRESSURE-SENSITIVE TAPES

For the newest in coated abrasives . . . watch BEHR-MANNING!

For additional information Circle No. 84 on the Reader Service Card

Prolong the life of your dies with PANGBORN HYDRO-FINISH®

Fine mesh abrasive suspended in water —that's how Pangborn Hydro-Finish precision cleans and finishes molds and dies. The result? Tolerances are held to .0001" and you get more years of service from your dies. In addition, Hydro-Finish eliminates further finishing operations by removing directional grinding lines . . . cleans off scale and discoloration in *minutes*.

For details on money-saving Hydro-Finish, send for Bulletin 1400A now! Write: PANGBORN CORP., 3500 Pangborn Blvd., Hagerstown, Md.

Pangborn

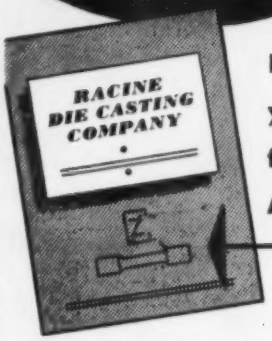
BLAST CLEANS CHEAPER
with the right equipment for every job

Pangborn's 50th Anniversary
1904-1954

ator or present in the furnace.

To make a test, the operator simply clamps a strip of metal of similar composition to the material being heat treated, between two electrodes visible within a Pyrex tube. Thus the material becomes a resistor in a circuit. The temperature of the specimen is controlled with a rheostat. The gas atmosphere to be tested is then supplied to the Pyrex tube. The operator raises the temperature of the specimen to the temperature of the material in the furnace, holds the sample at temperature for the desired length of time, then drops the atmosphere to the critical temperature at which the material would discolor in the gas atmosphere being tested. This establishes the length of time the material must pass through the critical range in the avail-

Looking For A Dependable Die Casting Service?



It's yours for the Asking

Die castings to specifications . . . that's our specialty. You'll get the job done the way you want it when you specify Racine, and you can be sure your tools and dies are fully protected in our special fireproof storage vaults. We invite your inquiries and will welcome an opportunity to serve your die casting requirements.

Send for our new, free brochure.

RACINE DIE CASTING CO.
1500 16th St. • Racine, Wis.

WE OWN THIS QUARRY

The products of this quarry have been used for many years by a nationally prominent tumbling supplier, whose name will be furnished upon request.

CHIP SIZES

#1	1¼ to 1¾	#3½	½ to ⅝
#2	⅜ to 1¼	#4	7/16 to ½
#3	⅛ to ⅜	#	⅛ to 7/16

Processed Limestone and Granite Chips

FOR PRECISION TUMBLING

Other tumbling supply companies charge 15c a pound for these same chips. We charge only . . .

8c LB. Packed in 100 lb. bags. Prices f.o.b. quarry.

X100 BURNISHING COMPOUND 20c LB.
(Other compound prices on request)

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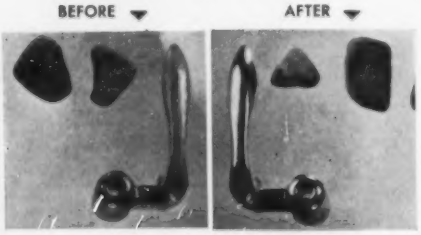

Write today for FREE chip samples so you can compare them.

UNIVERSAL TUMBLING SUPPLY CO.

Phones: VE 8-2071 • WO 3-9445

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able atmosphere to prevent discoloration.

The carbon potential of an atmosphere is determined by holding the specimen at temperature in the atmosphere for the desired length of time and then quickly cooling

The testing equipment is completely housed in a sturdy, metal case approximately 22" long, 9" wide and 9" high. The case is finished in attractive gray crackle enamel — can be locked shut to prevent tampering — and has a comfortable handle in the top for convenience in carrying from place to place. The weight of the complete unit is approximately 35 lbs.

The Electric Furnace Co.
For more information circle No. 204 on the Reader Service Card

HYDRAULIC POWER UNITS ... are self contained packages

Developed as a part of the company's die casting machines, new oil hydraulic power units are now available in a range of capacities from 7 to 54 gallons per minute oil consumption or delivery of pressures of 200 to 1000 psi. Horsepower requirements range from 7½ to 30 for these deliveries.

Finger tip adjustment of line pressure is possible on the power units and all piping and fittings are of high pressure steel and welded in the joints with flange connections to valves and pump to facilitate quick removal for repair.

Each unit has a magnetic

continued next page

When a threaded fastener is screwed into soft metal, something must be done to strengthen the female threads. Otherwise these threads quickly wear and strip and the fastener is either lost or made useless.

Of all the bushings now offered for strengthening the parent material at the tapped thread location, the Tap-Lok Insert* is outstanding for its effectiveness and for its savings in first cost, as well as in over-all cost. Because it is self-tapping, it eliminates the time-consuming separate tapping operation. The friction lock imparted to the insert by the self-tapping operation enables it to withstand vibration without loosening and assures maximum torque and pull resistance. It is not subject to the failures of cast and molded inserts.

Tap-Lok Inserts are used primarily as original equipment on regular production line assembly. They are also used extensively in production salvage and in maintenance work.

Send for descriptive folder

*Also manufacturers of Groov-Pins for positive locking press fit.

GROOV-PIN CORPORATION

1129 Hendricks Causeway Ridgefield, New Jersey

For additional information Circle No. 87 on the Reader Service Card

starter, push-button control and each is factory wired. The units are completely unloaded when the pressure setting is reached and do not pump against a pressure head or relief valve. This feature attributes to long pump life and low power consumption.

Rapid operation of equipment is facilitated by a 2 inch pipe delivery and return. The unit is complete with reservoir, accumulator (nitrogen charging inlet valves and bottle connections), baffled type oil cleaner, automatic water cooling, all electrical switching gear with wired-at-factory overload protection and 2 inch high pressure shutoff valve.

Harvill Mfg. Co.
For more information, circle No. 196 on the Reader Service Card

SLOTTED INSERT . . . for thread anchor

A new type of slotted insert which can be driven into a hole in metal, plastics or wood or cast as an insert in die cast pieces, to provide a permanent thread anchor, has been introduced.

Known as the WEG insert, it is supplied in sizes up to and including ¼". Larger sizes are installed with a simple insert driver; screwdriver installation is also reported to be fast.

Roylyn, Inc.
For more information circle No 202 on the Reader Service Card

MULTI-PURPOSE COMPOUND . . . finishes brighter faster

A recently introduced barrel finishing compound for use on a wide variety of metals is reported to produce brighter finishes in less time.

The new compound can be used for burnishing operations where three or four conventional compounds were previously required.

Use of the new compound is reported to result in up to 50 percent reduction in costs.

Action of the compound is said to be first as an effective cleaner and permits rapid deburring. It then develops progressively richer suds which act both as a lubricant and as an effective suspending agent, resulting in high luster and brilliant color.

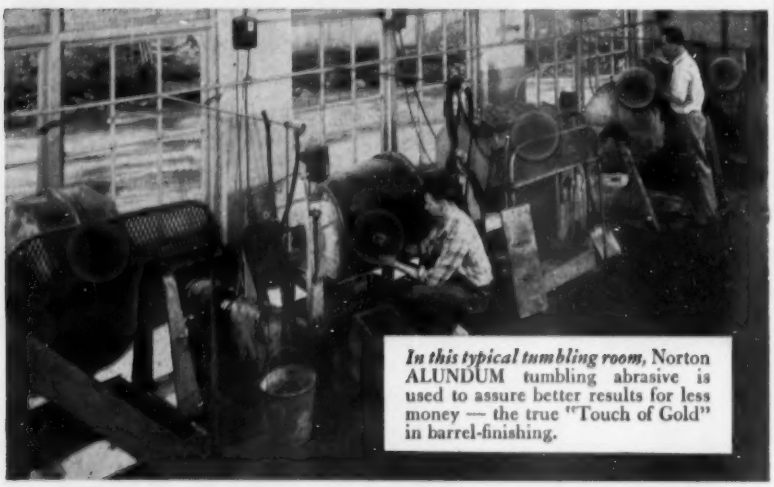
Minnesota Mining and Manufacturing Co.
For more information circle No. 198 on the Reader Service Card

TEST DIAMOND ABRASIVES . . . with comparison slides

A newly developed set of master comparison slides for use in microscopic inspection of diamond abrasives permits quick, accurate check of diamond particles for grading and degree of purity.

Slides, used with microscope, allow examination of particles in grades from 1 micron to 100 mesh through comparison of the diamond powder or compound with the diamond on the master slide. Polarizing attachment is used for testing purity .

Elgin National Watch Co. Abrasives Div.
For more information circle No. 203 on the Reader Service Card



In this typical tumbling room, Norton ALUNDUM tumbling abrasive is used to assure better results for less money — the true "Touch of Gold" in barrel-finishing.

Start with ALUNDUM* tumbling abrasive . . . and you'll finish with the "TOUCH of GOLD"

Especially developed to eliminate hand finishing of stampings, forgings and castings, Norton ALUNDUM tumbling abrasive is processed to impart a strong, blocky shape to the individual grains, with no sharp projections to mar the work. Here are some of the reasons why barrel-finishing with this tough, hard abrasive is standard in leading plants:

- It provides the fastest, most economical method of finishing metal parts to exact dimensions and surface finishes.
- It removes burrs, flash, tool marks and heat scale from large quantities of parts, saving endless man-hours.
- It eliminates many slow hand-finishing operations, increases production rate of parts ranging in size from tiny needles to hefty castings.

Learn how ALUNDUM tumbling abrasive can bring *you* the value-adding, cost-cutting "Touch of Gold" — by giving you constantly better finishing results while helping you shorten tumbling cycles, reduce scrap and reworking. Whether or not you have barrel-finishing, Norton will gladly make test runs for you, to show you what this process with ALUNDUM tumbling abrasive will do for you.

See your Norton Distributor, and ask him for the new edition of the 55-page booklet on barrel-finishing. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G-286

NORTON ABRASIVES

Making better products . . . to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

For additional information Circle No. 80 on the Reader Service Card

Product Facts

Catalogs Manuals Brochures

PROCESSES

Investment Castings: 144
What investment casting is and what it can do are briefly covered in a brochure from W. H. Anderson Co., Inc. The savings possible in tooling, material costs and better design are covered.

Metallic Friction Materials: 145
"Engineering Information," a booklet by Raybestos-Manhattan, Inc. gives the story of metallic friction materials, their engineering properties and the services, both engineering and manufacturing, that are available to customers.

Investment Casting Source: 146
In an eight-page brochure, Vascoloy-Ramet describe their investment casting facilities and show typical parts made by them. Several typical casting drawings are shown.

MATERIALS & EQUIPMENT

Casting Alloy Data Book: 150
The Apex Ternalloys data book is packed with technical data about the various aluminum casting alloys made by the Apex Smelting Co. Included are compositions, effect of room temperature aging and other engineering information.

Ethyl Silicate Technical Bulletin: 151
Union Carbide & Carbon Corp. has available a technical bulletin giving the uses and properties of the ethyl silicates. Recommended uses include bonding investment material for investment castings, sealing porous materials and other applications.

Applications of Electric Heat: 152
"101 Ways to Apply Electric Heat" is the title of a booklet recently issued by Edwin L. Wiegand Co. Space heaters, die heaters, liquid heaters and many other types are discussed.

Hydraulic Cylinder Catalogs: 153
A new line of hydraulic cylinders has been announced by Hydraulic Press Mfg. Co. The complete line (over 800 basic models) is described.

Magnetism in Stainless Steel Castings: 154
Empire Steel Castings, Inc. has issued an engineering report on the effect of and meaning of magnetism in stainless steel castings.

Fuel Fired Melting Furnaces: 155
Lindberg Engineering Co. has just issued a new bulletin (No. 29) describing their fuel fired melting furnaces known as the Lindberg-Fisher Simplex.

continued next page

a good pattern for you to follow

for dependable, trouble-free D.C. conversion . . . choose

Sel-Rex

SELENIUM RECTIFIERS

A recent survey of plants throughout the nation using rectifiers for DC conversion revealed that SEL-REX units were building up the greatest records in efficiency and dependability.

SEL-REX places no limitation on engineering to achieve the finest DC power plant . . . nor compromise in the choice of components to "bring the cost down". True, such a policy may reflect a slightly higher initial cost... but in the long run, a SEL-REX is the most economical. There are no moving parts to wear out, no maintenance expense, no loss of production.

SEL-REX RECTIFIERS are available for every requirement from 25 to 50,000 amperes in completely sealed water cooled or air cooled models.

Write Dept. PM-3 for complete details.

NEMA

BART-MESSING CORPORATION

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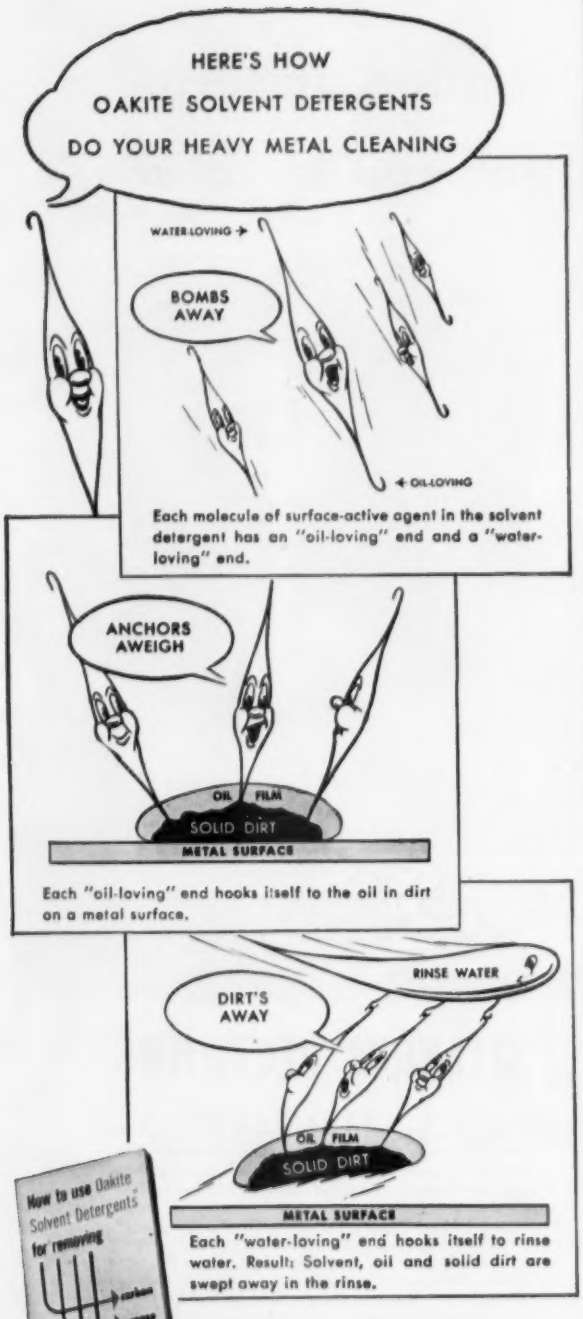
Circle No. 83 on the Reader Service Card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FILM
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Each "oil-loving" end hooks itself to the oil in dirt on a metal surface.
RINSE WATER
DIRT'S AWAY
OIL
FILM
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Each "water-loving" end hooks itself to rinse water. Result: Solvent, oil and solid dirt are swept away in the rinse.

Oakite solvent detergents help you remove drawing and buffing compounds and other thick, heavy, stubborn oils and greases. They offer economy, safe cleaning for all metals, rust prevention, reduction of fire hazards.

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Circle No. 91 on the Reader Service Card

PRODUCT FACTS — cont.

Surface Grinding Machine: 160
American Machinery Co. has recently announced a new surface grinder said to incorporate several new and desirable features. A bulletin is available describing the new unit.

FINISHING

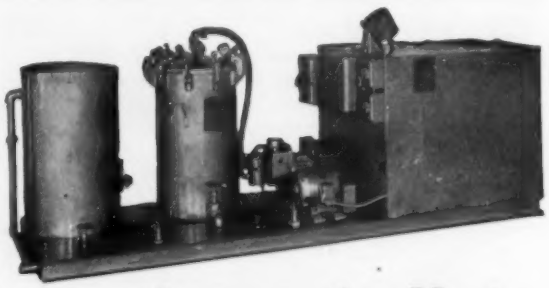
Degreasing Manual: 165
A comprehensive manual on vapor degreasing has been issued by Circo Equipment Co. This 32-page manual contains authoritative information and engineering data on vapor cleaning.

Metal Blackening Information: 166
Enthone, Inc. has available data sheets and information on blackening of products made from copper, zinc or steel.

Buffing Calculator: 167
A new slide-rule type of buffing calculator enables you to determine what buff to use for every job. It is available from American Buff Co.

Barrel Finishing Handbook: 90
A new 55-page handbook on barrel finishing has been issued by the Norton Co. The handbook gives essential data and information on all phases of barrel finishing.

New Chip Source: 168
Prices and information concerning a new source of processed limestone and granite chips for barrel finishing are included in literature from Universal Tumbling Supply Co. Illustrations include a photo of the company's quarry and some finished pieces. Chip samples are also available.



***A Packaged* Impregnating Plant**

THE MOGULLIZING VACUUM PRESSURE-UNIT

Model M-30

For low-cost, efficient impregnating of porous and leaking pressure castings, either ferrous or non-ferrous metals, use our MOGULLIZING Vacuum-Pressure System. The MOGULLIZER is made in all sizes from the small laboratory models of one cubic foot to the large industrial units with 100 cubic feet or more auto-claves (impregnating tanks). We obtain 29.5" or more of vacuum with this machine.

MOGUL Cast Seal is recommended with these units for impregnating all types of castings. No after-baking required.

Send us your problem and ask for booklet: "Mogul Cast Seal Impregnating Process"

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Dept. PMM
3520 W. Carroll Avenue • Chicago 24, Illinois
Circle No. 55 on the Reader Service Card

Flexible Shaft Machines: 157
For sanding, grinding, drilling, polishing, etc. flexible shaft machines have the advantage of taking the machine to the job. A bulletin from Stow Mfg. Co. describes the uses and advantages of their units.

Temperature Control Package: 158
The Bristol Co. has available a complete catalog giving engineering and application data for their package temperature control kits. A single kit contains all of the equipment necessary for the proper control of any heating system, either fuel or electric.

Drill Press Turrets: 159
With a Flying Dutchman drill press turret, one man on one drill press can do six consecutive drill press operations on a single spindle drill press, as described and illustrated in a bulletin from Howe & Frant, Inc.

Technical Data Book on Finishing: 169
The Seymour Mfg. Co. has available technical data on barrel finishing with bright nickel as well as data on nickel silver and phosphor bronze.

Metal Protective Reference Guide: 170
Just issued by American Chemical Paint Co., a new booklet called a check list of metal protective and paint bonding chemicals and processes is a handy reference guide to the proper material and method for treating metal surfaces for corrosion protection and pre-finishing.

Multiple Spindle Drill Heads: 171
If your machining operation calls for multiple drilling, the Thriftmaster Products Corp. catalog may list the drill head you need.

Bright Nickel from Barrel Plating: 172
A bulletin published by the True Brite Chemical Products Co. gives some of the "tricks" on improving nickel plating and cutting costs.

Liquimatic Finishing Data Book: 173
J. C. Miller Co. has a comprehensive finishing manual detailing the advantages of Liquimatic liquid buffing compound for all metals.

Descaling Bulletin: 174
Descaling and derusting of metals without the use of caustics or acids is described in bulletin No. 36 published by the Magnus Chemical Co., Inc.

Finishing Aluminum: 175
The Technical Advisor, published by the Reynolds Metals Co. has an article on electroplating aluminum and another on finishes for aluminum in issue No. 23.

Emulsion Type Cleaner: 176
To remove grease, oil and other grime from steel prior to electroplating Enthone, Inc. recommends an emulsion type cleaner. Descriptive literature on these cleaners is available.

Masking Material for Plating: 179
An easily applied hot wax type of masking material for use as a stop-off in plating is described, and applications given in literature available from Western Coating Co.

What is YOUR PRODUCTION PROBLEM?

Investment Castings by **ARWOOD** will solve these problems.

ALLOY High strength, hard to machine alloys are cast, eliminating production and performance problems.

MACHINING Tricky shapes, involving complicated machining, are investment cast to shape.

ASSEMBLY Several small parts can be cast as one unit, eliminating assembly.

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For complete details on the process we will gladly furnish our booklet "Alloy Selection and Design for Precision Casting".

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ARWOOD offers:

CAPACITY 3 production plants with complete tooling facilities.

METALS Castings in all ferrous and non-ferrous alloys including magnesium.

QUALITY CONTROL Air Force approved X-ray and heat treating facilities. Physical testing equipment and metallographic laboratories.

SERVICE Sales engineers in every large industrial center of the country.

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PRECISION CASTING Corp.
66 WASHINGTON STREET BKLYN 1, N. Y.
Plants: Brooklyn, N. Y. • Croton, Conn. • Tilton, N. H.

For additional information Circle No. 9 on the Reader Service Card

REFERENCE DATA
continued from page 16

87. HOW TO PREVENT thread stripping in soft metals and plastics is explained in the Groov-Pin catalog on their Tap-Lok inserts.

88. TEXTURE PLUS MULTI-color paint with a single spray coat is the advantage ascribed to Plex-tone finishes in new literature offered by Maas & Waldstein. Color chips of the new type finishes are available.

89. HOLE DEBURRING with rotating tools is discussed in a brochure from the Nobur Mfg. Co.

90. BARREL FINISHING is the subject of a 55-page guide book offered by Norton Co.

91. PRECLEANERS AND STRIPPERS for paint are described in a 24-page booklet from Oakite Products, Inc.

92. INCREASE DIE LIFE by Hydro-finishing, according to detailed information in bulletin No. 1400A from the Pangborn Corp., describing the equipment and process. Case histories are given.

93. HIGH SPEED TAPPING heads to increase production are described in an illustrated brochure put out by the Procunier Safety Chuck Co.

94. BARREL FINISHING DATA and catalogs on Roto-Finishing are available from Roto-Finish.

95. TECHNICAL DATA and detailed information on rectifiers, tantalum heating coils and SRHS chromium solutions are available from United Chromium, Inc.

96. DIE CASTING DIES built to specifications in Germany. Full details can be secured from Karl A. Neise Co.

99. HOW TO GET THE MOST for your die casting dollars is the subject of a brochure from Chicago White Metal Co.

16. DIE CASTING MACHINES built by Cast Master are presented in a catalog that includes complete specs.

33. NON-FLAMMABLE FLUID for use in the hydraulic systems of die casting machines and other installations where fire is a hazard, is the subject of Monsanto's brochure on Pydraul.

37. DIE CASTING MACHINES from Hydraulic Press Manufacturing Co. are illustrated and described in literature from HPM.

47. COMPLETE INSTALLATIONS of die casting machines, hydraulic presses, etc., including tooling, are offered in a new service available from Lake Erie Engineering.

66. PRESSURE CASTINGS have available a booklet on their facilities for producing high quality die castings.

75. HARDENERS FOR ZINC are introduced in a new brochure from U. S. Reduction, describing their Z-3 and Z-5 hardeners.

Light and Tough
FOR HEAVY DUTY SERVICE
ALUMINUM MOTOR HOUSING FOR TRUCK AXLES
Here is a typical Accurate die casting which is subjected to strain and rough usage under adverse operating conditions. Minimum weight and maximum strength are combined to assure long life and top performance in this motor housing for Eaton's Famous 2-speed axle Electric Shift. You too may be able to save time and money and get the production you need when you want it with an "Accurate" die casting.
Bring your design and production problems to our Engineers. Write or wire today for prompt service.
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For additional information Circle No. 2 on the Reader Service Card

METAL HYDRIDES FORMS NEW DEVELOPMENT SECTION

Dr. Peter P. Alexander, chairman of the board and director of research of Metal Hydrides, Inc., producers of metallurgical hydrides, chemical hydrides, metal powders and alloy powders, has recently announced the formation of a new Metallurgical Development Department.

The work of this new department will be headed by Emanuel Gordon, Metal Hydrides' chief metallurgical engineer.

A graduate of Northeastern University in 1941, Mr. Gordon

Emanuel Gordon

took advanced studies at the Carnegie Institute of Technology and at Massachusetts Institute of Technology. In May, 1952, he joined the Metal Hydrides' staff as a metallurgical engineer.

The comparatively recent application of products developed by the Metal Hydrides Hydrimet process to industrial uses has opened up many new concepts in chemistry and metallurgy.

NEW ALUMINUM PLANT OPERATING IN TEXAS

The LaQuinta alumina plant of Reynolds Reduction Company, a wholly owned subsidiary of Reynolds Metals Company, is now substantially completed and is being operated by the latter company, it is announced by J. Louis Reynolds, vice-president in charge of operations, Richmond, Virginia. Located on the north shore of Corpus Christi Bay in south Texas, the plant has a rated output of 1000 tons of alumina daily.

"This installation is unique in several respects," Mr. Reynolds pointed out. It is the first alumina plant to be built in Texas. With the huge San Patricio reduction plant next door, it now gives Texas a completely integrated bauxite-to-aluminum operation."

Taking advantage of mild Texas weather, all the equipment is located out-of-doors. "Another innovation," said Mr. Reynolds, " is that the facilities are built in two sections, each with a rated capacity of 500 tons of alumina daily. The two sections can be operated independently, or together, providing increased flexibility"

DIE CASTERS! DIE MAKERS!

SAVE on Die Construction Time!

With D-M-E STANDARD

DIE CAST DIE ASSEMBLIES!

Using D-M-E

STANDARD CAVITY RETAINER SETS and EJECTOR BOXES

D-M-E Cavity Retainer Sets are of high quality Alloy Steel and are precision ground, flat and square. Std. plate sizes are from 7/8" to 5 7/8" thick and are aligned with sturdy, precision-built leader pins and bushings.

D-M-E Standard Ejector Boxes are of light-weight, welded steel construction. Std. sizes carried In Stock from 12" x 12" to 18" x 29½". When you specify D-M-E Standards, you get . . .

The Perfect Combination For Quality Die Casting

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LOS ANGELES 7, CAL. 3700 SOUTH MAIN STREET, ADAMS 3-8214

For additional information Circle No. 24 on the Reader Service Card

H. COHN PRODUCES SECONDARY ALUMINUM

H. Cohn & Sons, Inc., Chicago smelters of zinc alloys, have now started the production of secondary aluminum ingot, it has been announced.

A new plant addition of about 25,000 square feet has been built to produce the aluminum alloys. Three furnaces have been installed and company officials expect to be producing about 1,000 tons of secondary ingot per month within six months.

The company was organized in 1933 and its officers are Al Cohn, president; Jack Cohn, vice president, Maury Cohn, secretary and treasurer; and Shire Kipnis, secretary.

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For additional information Circle No. 62 on the Reader Service Card

SHORT RUN — LONG RUN
continued from page 55

that investment casting and rubber mold casting may have wider industrial applications where many variations on designs have to be put into production, or where required quantities cannot be accurately predicted, or where depth and definition in design are impossible by die-struck process.

While accuracy of dimension is not a requirement of jewelry type casting, perfect reproduction of surface detail is essential. These castings are finished by manual polishing, electroplating where the tin base alloys are used, oxidizing or other special treatments, and highlighting. Links and other attachments are fastened by soft soldering.

CAST ANODES
continued from page 49

dom adequate space to insert a full length rigid rod.

These replacement anodes are generally made up in twelve inch sections joined together by the steel core wire. Various types of joints have been used. With a simple "hook and eye" type, a high resistance film rapidly builds up and soon the anode ceases to work. On other rods, the steel wires are joined by welding or brazing and a soft enough wire is used to allow it to be bent to ninety degrees and then straightened. Such a joint requires that the core wire extend past both ends of the magnesium.

When these sectional anodes are extruded, each end must be machined to expose the core wire with, as noted, loss of material and added cost for machining. With a permanent mold casting, no machining is needed prior to welding.

Industry News

Companies · Plants · Associations

16,000 Pounds of Ingot Per Hour As . . .

. . . Henning Bros. & Smith Erect New Building To Produce Zinc Die Casting Alloys

A conveyorized melting and pouring system for the production of zinc die casting alloys has been put into operation by Henning Bros. & Smith, Inc., in the company's newly erected zinc alloy plant.

This modern, automatic setup not only expands the company's facilities for production of zinc alloy, but separates the zinc operations from the other non-ferrous melting done by the company, and allows the introduction of improved quality control.

Henning Bros. & Smith was established in 1922, and produces lead, brass, bronze and aluminum alloys, as well as zinc. The new zinc building is adjacent to the company's other buildings at 91 to 113 Scott Ave, Brooklyn.

With this new arrangement for melting and casting ingots, the company is able to cast at a rate of 16,000 pounds per hour. Comparing this production rate with the old system of hand-pouring which is still very widely practiced, a furnace can now be poured in 20 minutes without heavy physical labor, while the same furnace would previously have required between 2½ and three hours to pour.

As designed now for rapid production, the general layout includes four large melting pots, two on each side of a mold conveyor. The furnaces are automatically controlled.

The hardeners (aluminum, copper and magnesium) are added to the molten zinc in liquid form and stirred by electric mixers. The resulting alloy is pumped from the bottom of the melting pot, eliminating all dross, through type 303 stainless steel pipes into a pouring ladle that straddles the conveyor.

The pouring ladle (described as the toughest design problem of the entire setup) pours five ingots at a time through two special sets of pouring lips. The ladle is operated by a lever system, allowing the operator to stand several feet away.

The molds, each containing five cavities, move continuously, passing lengthwise under the pouring ladle with the five cavities being filled simultaneously. Each cavity is 26 inches long and four inches wide; with the conveyor moving at approximately eight feet per minute, the filling can be accomplished without stopping. The pouring lips have an attachment for skimming the ingots as they are poured.

The ingots are then carried along through a cooling cycle, marked, automatically dumped and they then come out on a roller conveyor at the opposite end of the building. The empty mold is returned through another cooling cycle to be poured again.

NEW CLEVELAND HARDWARE SALES REP.

The Cleveland Hardware and Forging Co., Cleveland Ohio, announces the appointment of P. R. Vallee as its representative in Eastern Wisconsin and Upper State Michigan.

Cleveland Hardware manufactures a complete stock line of drop forged truck and body

hardware, forgings and die castings to specification. Mr. Vallee, in addition to representing Cleveland Hardware, will represent the Reliable Spring and Wire Forms Co. and The Zeller Corporation as he has been doing for the past eight years.

His address is 2302 West Clybourn Street, Milwaukee, Wisconsin.

ROBERT FULTON JOINS EASTON METAL POWDERS

Robert Fulton has been appointed assistant to Gregory J. Comstock, vice president of Easton Metal Powder Co., Inc. the company has announced. Mr. Fulton will serve as assistant in charge of sales matters. He has previously been with Charles Hardy, Inc., of New York, and the Plastic Metals Div. National Radiator Co.

Easton Metal Powder Company, whose sales offices are located at 233 Broadway, N. Y., manufactures iron powder.

Koegler Honored On Fortieth Anniversary

Frank J. Koegler, vice president of National Lead Company and general manager of its Doehler-Jarvis Division, receives congratulations from company officials — H. H. Doehler, founder of Doehler- Jarvis; Mr. Koegler; Joseph A. Martino, president of National Lead Company; and Alfred H. Drewes, National Lead vice president — (reading from the left.)

Coming from New York for the occasion, these executives joined with more than 100 of his friends and associates in honoring Mr. Koegler at a 40th anniversary dinner in Toledo's Commodore Perry Hotel on January 22. In acknowledging their tributes to his lifetime service with the Doehler-Jarvis organization, Mr. Koegler stressed the future, as he looks ahead to his continuing management responsibilities, and underscored Mr. Martino's emphasis on good prospects for the coming year.

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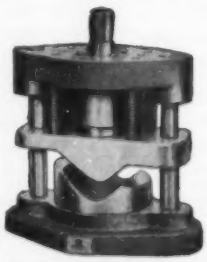

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Aluminum Association Elects Officers at Annual Meeting

At the three-day annual meeting of The Aluminum Association held January 19-21 in New York, D. A. Rhoades, Kaiser Aluminum & Chemical Corporation, Oakland, California, was re-elected president for the year, Arthur V. Davis, Aluminum Company of America, New York, was re-elected chairman of the board and Donald M. White reappointed secretary and treasurer.

The following vice-presidents were re-elected to serve The Association for the ensuing year: S. D. Den Uyl, Bohn Aluminum & Brass Corporation, Detroit, Michigan; Raymond Deutsch, Monarch Aluminum Manuacturing Company, Cleveland, Ohio; and R. P. Stranahan, Stranahan Foil Company, South Hackensack, New Jersey.

David P. Reynolds, Reynolds Metals Company, Louisville, Ky., was elected a director at large to serve a three-year term and directors George A. Ginsburg, New Haven, Conn., and Harry L. Smith, Jr., Aluminum Company of America, Pittsburgh, Pa., were re-elected to serve three years.

The Association's four active commodity divisions also held sessions and elected officers during the three-day meeting. F. W. Boynton, Reynolds Metals Company, Louisville, Kentucky, was re-elected chairman of the Extruded Products Division; Stanley H. Wilson, Revere Copper & Brass Inc., New York, was re-elected to represent the division on the Association's board of directors. R. P. Stranahan, Stranahan Foil Company, South Hackensack, New Jersey, was re-elected chairman of the Foil Division and John W. Douglas, Republic Foil and Metal Mills, Inc.,

HEADS FOUNDRY DIV.

R. G. Tessendorf

Danbury, Conn.; was re-elected to represent the division on the board.

In the Foundry Division, R. G. Tessendorf, Aluminum Industries, Inc., Cincinnati, Ohio, was elected chairman and J. Frank Seeley, Bohn Aluminum & Brass Corporation, Detroit

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Michigan, vice-chairman; E. G. Fahlman, The Permold Company, Medina, Ohio, was designated the division's representative on the board of directors and D. M. White was renamed treasurer.

The Sheet Division re-elected L. M. Brile, Fairmount Aluminum Company, Fairmount, West Virginia, as its chairman & R. W. Goss, Scovill Manufacturing Company, Waterbury, Conn., was re-elected to represent the division on the board of directors.

Four new members were announced at the meeting: Anaconda Aluminum Company, New York; Magnesium Company of America, East Chicago, Ind.; Sonken-Galamba Corporation, Kansas City, Kan.; and R. D. Werner Company, Inc., Greenville, Pa.

Member companies of The Aluminum Association account for all the primary aluminum production in the United States and about 85 percent of aluminum semifabricated products.

TECHNICAL DIRECTOR RETIRES FROM BRITISH FIRM

Harold Higinbotham, technical director of Acheson Colloids Limited, London, unit of Acheson Industries, Inc., New York, has retired from active service although remaining on the Board of Directors. Howard A. Acheson, president of Acheson Industries, Inc., retains the position of managing director while E. G. Clarke has been appointed assistant managing director.

TRANSFER SILICONE UNIT

The General Electric Company's Silicone Products Department has announced the transfer of its Technical Service Unit from its Engineering Section to the Marketing Section, in an organizational move designed to bring custom engineering of silicone products closer to end-user needs.

WEST COAST GETS NEW DIE CASTING CONSULTANT

Louis Miller, recently manager of labor relations for the Doehler-Jarvis Division of National Lead Company at Toledo, Ohio has moved to California to practice as a management consultant to the die casting and allied industries.

He has located at 5026 Odessa Avenue, Encino, Cal.,

Louis Miller

and will advise on all phases of industrial engineering and labor relations.

For some twenty years he has worked in the development of work standards, wage plans, incentives operations, job evaluation and personnel adminisistration, and was in full charge of labor relations at Doehler-Jarvis Corp.

IT COULDN'T BE CAST
continued from page 42

for 4-40 tap holes, and the only way to assure specifications was by 100 percent inspection.

In fact, the company found itself doing 100 percent inspection at six different stations: for rough casting; two different thread measurements; milling of pressure seal surfaces; pressure test for porosity; and a final check of the entire panel. **The cost of these inspections alone was 92.5 cents per panel.**

Moreover, production was begun with 39 drilling and milling operations in place of the 10 originally estimated. According to Winthrop Brown, Tri-State's production manager, the number of acceptable pieces in the first few thousand castings, even with complete inspection and more machining than planned, was a startling low one or two percent.

Gradually this percentage improved, although the company never was able to build up an inventory.

Still another problem proved to be internal porosity. The original prints called for a nonporous casting but did not require inspection such as x-ray and made no mention of pressure impregnation. However, one of the company's customers developed and used a pressure testing fixture which showed about 50 percent of the panels were "leakers."

The company ordered pres-

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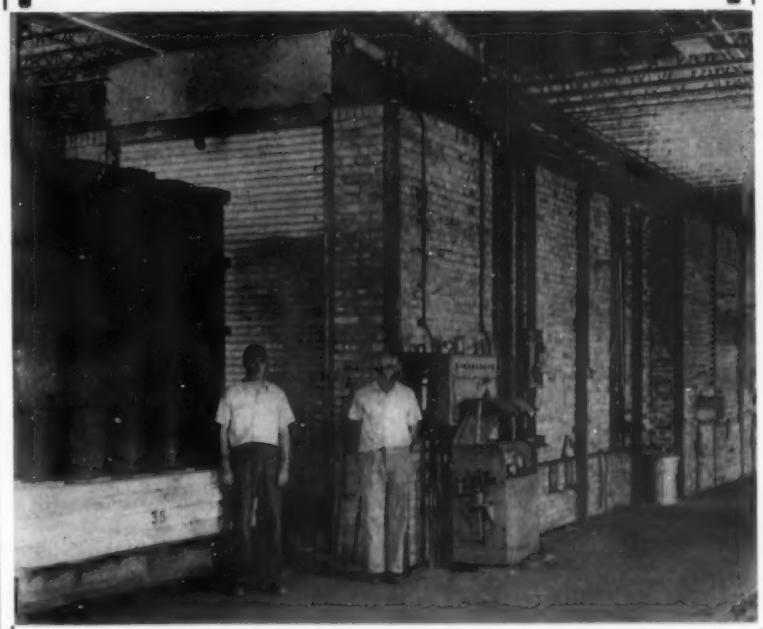

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Part enlarged 14 times

An investment casting made of
BERYLCO BERYLLIUM COPPER

One of the smallest castings ever produced, this rifle peep sight of Berylco beryllium copper was formerly machined from extruded steel stock. Size made machining difficult, and it was impossible to consistently obtain the results desired from a steel investment casting. Berylco beryllium copper, on the other hand, reproduces minute detail (notice the serrations), permits sections as thin as 0.050", allows a tolerance of plus and minus 0.001" on the ⅛" distance between hole centers.

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In addition to offering design and production advantages which result in lower costs, Berylco compares favorably in strength and wear resistance with medium carbon and stainless steels, has greater corrosion resistance and electrical conductivity. These are some of the reasons why more and more designers are specifying Berylco for precision investment cast parts.

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sure impregnation at extra cost and warned Tri-State that increasingly rigid inspection by the Signal Corps eventually would force other customers to do the same. The die caster tried its best to sell other customers on impregnation, Brown explains, but got nowhere until the Signal Corps rejected some 1,500 panels for internal porosity.

After this mishap, the company refused to sell any more without impregnation treatment. Subsequent loss of panels due to internal porosity has been only four in over 10,000 panels shipped.

When a new mold was put into service in March of last year, the casting was far better and the number of machining operations was reduced from 39 to 26. But inevitably, perhaps, the Army kept raising its quality standards as the company's ability to meet them was achieved, and as production approached requirements. Panels which were accepted a year and a half earlier would be rejected. Nevertheless, the company had reduced its scrap pile to about 17 to 20 percent and met output schedules.

In a year and a half on the job, the company turned out about 65,000 castings with a value of abut $500,000. The original guess had been that there would be no money in the job, and final figures bear this out. However, in the process, the company has met all requirements, has solved many difficult production problems, and has learned many pointers which are useful in other military and civilian work.

It represents the manner in which the die casting industry, as a whole, has improved its product, has increased the range of products it is capable of casting, and has met standards which, a few years ago, would have been called completely impossible.

Vacuum Die Casting

• what it is

• where it can be used

A NEW method of producing zinc alloy die castings under vacuum to obtain pieces with exceptionally high density and surface quality has been introduced by Nelmor Corporation of Detroit.

This casting method is accomplished by sealing standard die casting dies for relatively high evacuation of the die cavities before injecting molten metal. These methods are reported to be practical on a production basis.

Nelmor, which operates die casting, stamping and forming departments, had been concerned over the consistently higher scrap loss in their die casting department than in the others. In addition to hot inspection scrap loss immediately following the casting cycle, hidden flaws resulted in additional rejections when the castings reached the buffing and chromium plating operations.

The high quality standards of the automotive industry, large buyer of rear-vision mirrors, hand spotlights and other polished and plated items made from the company's die castings, increased the number of rejects at the final inspection.

Introduction of vacuum casting methods for producing pieces that had been particularly troublesome has been reported by an independent testing laboratory to result in an increase in skin hardness and thickness, and higher tensile strength.

These results have been accomplished under the direction of Alfred P. Federman, originator of the methods and equipment for this process.

The vacuum process employs a standard die casting machine operating under special, semi-automatic electric controls, and can accommodate any die that can normally be mounted in the machine.

Some die adaptation is necessary for the purpose of holding a vacuum, but this does not impair its use by standard casting procedures.

This process has a somewhat longer casting cycle than conventional die casting, and appears to have its greatest potential usefulness for castings that are extremely difficult or impossible by the standard methods. According to Nelmor engineers, any die cast part resulting in ten percent or more rejects can be vacuum cast economically. The type of castings most likely to be benefitted by the vacuum process are said to include quality chromium plated pieces; castings that must be heated during processing, as in paint baking; castings having higher than normal strength requirements; pressure-proof castings; castings requiring conductivity and balance; and in general, parts where the design requires non-ventable pockets, deep draws with insufficient casting pressure, or where cold shuts cannot be avoided.

At the time of writing, equipment was in operation only for zinc alloys, but a vacuum casting unit of the cold chamber type for aluminum

DENSE SURFACE is obtained on this vacuum cast mirror arm.

HIGH TORQUE TEST is obtained by vacuum casting this nut.

and magnesium alloys was expected to be ready for operation early in March.

For comparison of results of standard and vacuum casting operations in the Nelmor plant, two production parts were used. One of these, a rear-vision mirror frame casting, was selected because it had consistently been the most troublesome casting of its type. While no department statistics are available, it is estimated that more than 25 percent scrap occurs in casting, buffing and plating. The other part, a back-up light switch housing, could not consistently be held to the minimum torque test requirements of 32 foot-pounds.

These two parts were run alternately as standard and vacuum; the vacuum die cast nut showed an increase in torque tests to 55-60 foot-pounds, and the mirror arm showed an increase in depth of harder surface skin to allow heavier buffing without exposing porosity.

Some of the significant comparisons in these castings, as determined by Cosma Testing Laboratory of Cleveland, are as follows:

Skin Hardness: Testing with a Rockwell hardness tester using the H scale, average hardness for 24 castings of each type show standard castings — 4.2; vacuum cast — 5.9.

Tensile Strength: Average tensile strength determined on six mirror arms produced by each process shows standard castings — 78,000 psi; vacuum castings — 82,383 psi. This is an increase of 5.62 percent. Absolute values are much higher than normal and this is believed to be due to the high percentage of skin section present in the tensile strips.

Surface Quality: Zyglo Fluorescent Penetrant inspection was applied to 24 of each type of nut and 16 of each type of mirror arm. No surface indications were found on any of the castings, either standard or vacuum, demonstrating that a sound skin was present.

Depth of Skin: Several arms were sectioned, metallurgically prepared, and examined at magnification of 50X on the metallograph. Measurements were made of skin depth to a given small porosity concentration. Skin depth is arbitrarily defined as the distance from the surface to the parallel edge of the first square inch to contain ten voids. Skin depth is: standard casting — .03; vacuum cast — .05.

X-ray Inspection: Both types of castings reveal a material decrease in concentration of voids in heavy sections.

Average Weight: Six castings by each method were weighed, with the following results: average weight of arms by standard casting —

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108.77 gr.; by vacuum 109.58 gr; increase — .75 percent.

Average weight of nuts by standard casting — 48.61 gr.; by vacuum casting — 49.07 gr.; increase — .94 percent.

NOMINATIONS FOR ANNUAL DOEHLER AWARD INVITED BY DIE CASTING INSTITUTE

Nominations are now in order for the highest honor conferred each year by the American Die Casting Institute, the annual Doehler Award for outstanding contribution to the advancement of the die casting industry and process.

The award, presented each year at the annual banquet which climaxes two days of annual meetings, consists of a plaque and a cash honorarium of at least $500, representing income from a $25,000 perpetual trust fund set up in 1949 by the Doehler-Jarvis Corp.

The award is made for outstanding contribution to the advancement of the industry or the art of die casting in technical achievement, advancements in plant operations or other activities not primarily of a scientific or operational nature that enhance the reputation or acceptance of die castings.

The Award Committee who will make the selection consists of the Board of Directors of the American Die Casting Institute, which will receive nominations at the Institute's office, 366 Madison Ave., New York 17, N. Y., until April 15.

DISTRICT MANAGERS NAMED BY CLEVELAND AUTOMATIC

The Cleveland Automatic Machine Company, manufacturers of die casting machines and single spindle automatics, has announced two new appointments of district managers. William C. Bredenbeck has been appointed district manager of the company's Cleveland office and T. F. Taggart will head the Cincinnati office. Mr. Bredenbeck has been with Cleveland Automatic for 40 years, having served as testing foreman and service director.

William C. Bredenbeck

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This kind of experience points up one thing: Impregnation has "come of age"—quite largely because of Tincher research and development. For instance, right now we have new but thoroughly field-proven formulas for Tincher IMPREX Metallic Sealants that insure deep penetration and positive sealing. We also have a new IMPREX Plastic Sealant that permanently cures very coarse porosity—even "squirters".

We'd like you to make us *prove* that we can eliminate porous castings as a problem in your plant. Send us a sample batch of castings that you have found to be porous. We'll pay the shipping costs both ways—impregnate them and return them to you. *You test 'em, under your own conditions*—see for yourself whether we can do what we say. NO OLIGATION WHATSOEVER—but do it now! Send coupon for shipping instructions.

*Castings that must withstand liquid or air pressures and which have been rejected after tests as "leakers".

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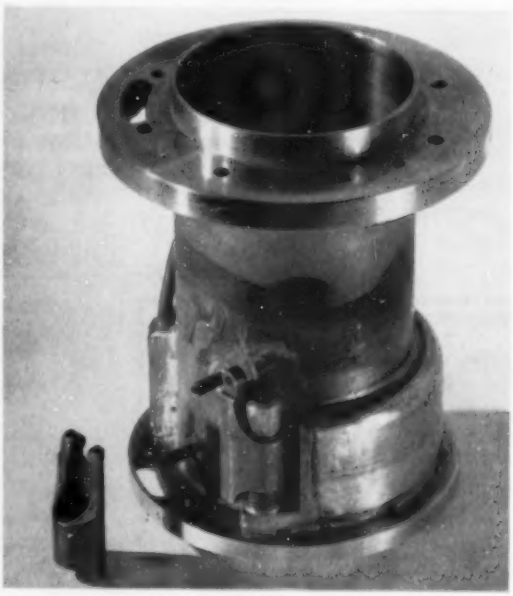
GYRO INVESTMENT CASTINGS
continued from page 40

size. The entire inside surface was previously milled, but now two pads are provided for a light, finishing cut.

The gimbals are investment cast in 303 stainless steel.

Three small investment castings

The thermostat bellows housing, Figure 5, is an instance where the odd shape of the component made it a natural for investment



5. MADE TO FIT into a cramped space, the shape of this tiny thermostat bellows housing, left, is most economically produced by investment casting.

casting. Its exterior form is dictated by space limitations within the cover. At one point, the wall is only .164 thick.

Although this casting is not critical dimensionally, the center hole has a tolerance of + .008 — .000. It is used as cast, except for the drilling of small holes in the top of the switch activating lever. The material chosen for the thermostat bellows housing is 416 stainless steel.

The bushing, Figure 6, is cast in beryllium copper alloy. It was originally hogged from solid 303 stainless bar and was, then investment cast in a stainless steel alloy. However, at the suggestion of the investment caster, it was converted to the lower cost,

6. BERYLLIUM COPPER proved to be a less expensive alloy for investment casting this bushing, left.

easier casting beryllium copper which has very satisfactory performance characteristics.

The conversion to investment casting has saved drilling, hollow milling, chamfering the face of an inside boss, and facing the back.

Also shown in Figure 6 is the switch actuating lever which mounts at the top of the thermostat bellows housing. Investment casting in 303 stainless steel has been specified as a lower cost fabricating method than the alternative method, machining and forming from bar stock.

ELIMINATE SMALL PARTS MACHINING

Five small parts of this machine are plaster mold castings of OPC #40 bronze. Held within specified ±.005" tolerance, they require no finish machining — that's OPC accuracy and smoothness. The "teeth" on the underside of Part D are cast to match the thread of the screw feed — that's OPC preciseness of detail. We'd like to help solve your small parts production problems the same way!

Photo courtesy Kalamazoo Machinery Builders, Inc.

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ALUMINUM AND ZINC DIE CASTINGS

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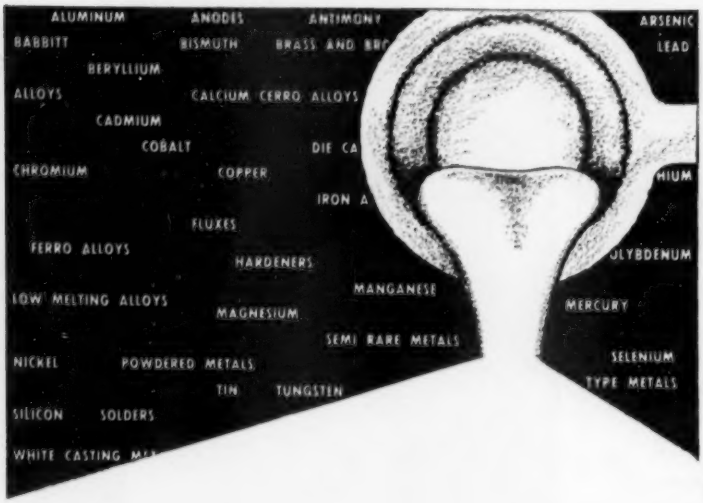

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REYNOLDS OPENS REDUCTION PLANT

Reynolds Metals Company's new Robert P. Patterson aluminum reduction plant, located near Arkadelphia, Ark., now is in operation, according to an announcement by J. Louis Reynolds, the firm's vice-president in charge of operations.

The facility, named in honor of the late company vice-president and directory, has an annual rated capacity of 110 million pounds of virgin aluminum. Completion of the new plant gives Reynolds an annual production capacity of 829 million pounds.

J. W. Hutchison is manager of the new plant, which cost an estimated $34 million. Its construction was entirely privately-financed. The facility, the most modern of its type, is located on a 780-acre south of Arkadelphia, just off U. S. Route 67, the main highway between Little Rock and Texarkana.

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PRODUCTION "QUIZ" SESSIONS TO BE FEATURED AT 1954 ASTE EXPOSITION

Over 30 top production experts will be "quizzed" by the engineers and executives attended the 1954 ASTE Industrial Exposition at Philadelphia, April 26 through 30. The production experts will participate in five feature panel discussions.

"Topics of the panel discussions were selected in line with our "tooling for competition' theme. Panel members will discuss vital phases of their subject and will welcome quizzing from the audience," Harry E. Conrad, executive secretary of the ASTE, said.

Production Planning

First of the panel discussions will be on Monday, April 26, at 3 p.m., in the ballroom of the Philadelphia Convention Center, site of the Exposition.

"How To Take The 'Bugs' Out of Your Production Planning and Control" will be the topic. Management, planning and operations experts will discuss the design and use of operations process sheets, flow charts, operators' instruction sheets, machine loading schedules, and scheduling, routing an dispatching operations and paperwork.

Tooling For Automatics

"The Why and How of Better Tooling for Automatics" will be the topic for the panel discussion on Tuesday, April 27. The discussion will be held in the Ballroom of the Convention Center at 3 p.m. Production tooling on screw machines, turret lathes, and single- or multi-spindle automatics will be discussed.

Milling Problems

A group of specialists in the milling field will discuss "How to Lick Your Tough Milling Problems" on Wednesday, April 28. This panel discussion will be held in the ballroom of the Bellevue-Stratford Hotel at 8 p.m.

Inspection Improvements

"How to Improve Your Inspection Ways and Means" will be the topic for the panel discussion group on Thursday, April 29. This meeting will be in the Convention Center Ballroom at 3 p.m. Equipment, operation and supervision are represented on the panel. Quality control, manual and automatic gaging and non-destructive testing will be discussed.

Improved Workholding

One of the oldest, yet still challenging, responsibilities of tool engineers will be discussed by a panel of experts on Friday, April 30, at 3 p.m., in the Convention Center ballroom. Topic of the discussion will be "How Others Have Improved Their Workholding Ways and Means." The panel will discuss fixtures jigs, chucks, and collets and their actuation.

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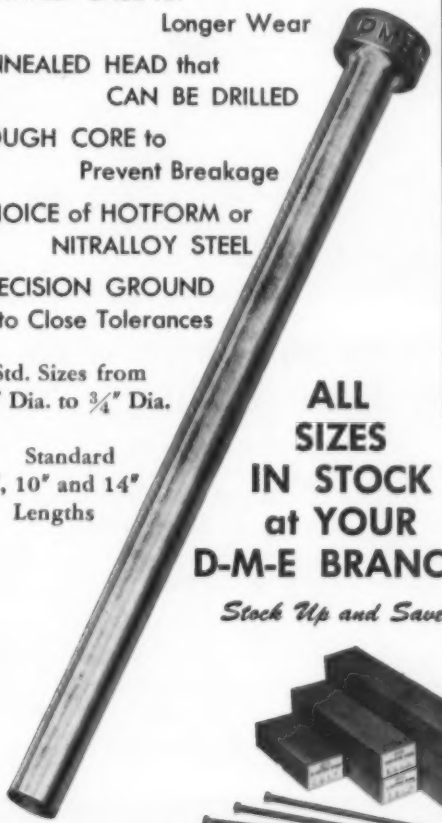

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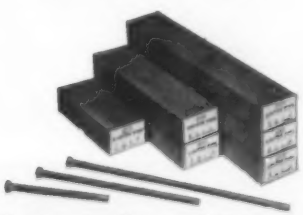

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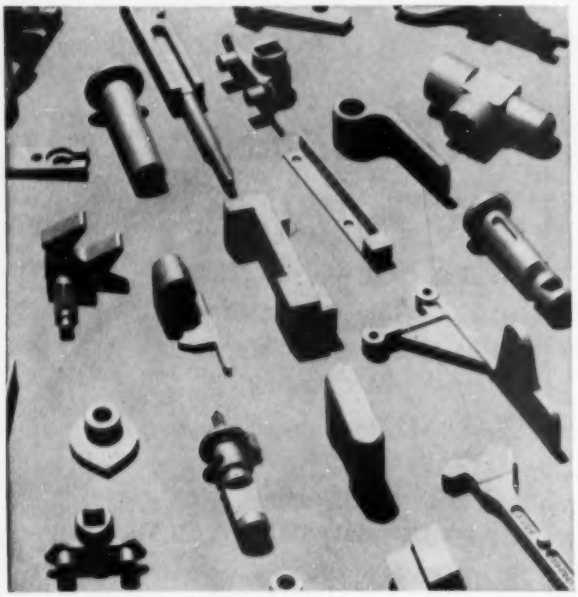

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WANTED — Two established sales representatives for Iowa and Michigan to sell zinc and aluminum die castings on commission basis. Give complete representation set up. Write Box 3454, PRECISION METAL MOLDING magazine.

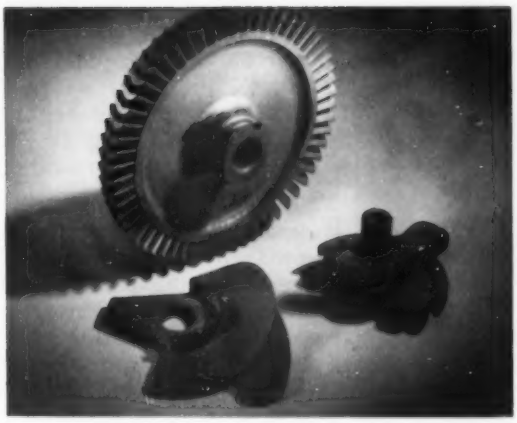
MANUFACTURER'S REPRESENTATIVE WANTED by investment casting company producing quality parts by lost wax process in all castable alloys. Representative should have related lines such as sand castings, forgings die castings, etc. Exclusive territories open in Western and Central New York; Maryland- D. C. - N. Virginia; Missouri-Kansas-Illinois; Texas; and Eastern Wisconsin. Write Box 3554, PRECISION METAL MOLDING magazine.

CORRECTION

The gremlins who have been working in our photo file department lately put a picture of a father along with a news item about his son in the February issue of PMM. The item announcing the promotion of K. F. Koegler to the position of works manager of the Toledo Plant No. 2, Doehler-Jarvis Div., National Lead Co., was accompanied by the picture of Frank J. Koegler, his father, who is vice president and general manager of the entire Doehler-Jarvis Div.

A correct picture of Frank J. Koegler appears on page 86, as he is honored for 40 years service with the company.

Simplified Solutions for product design problems



BALANCE AT HIGH SPEED places severe dimensional limits on the rotor, shown above left. To gain the necessary precision of dimension, these rotors are investment cast in a nickel beryllium alloy by Electronicast, Inc. The blades, measuring about four inches in diameter, are tested at 60,000 rpm and operated at 40,000 rpm. Shown with the rotor are two highly complex investment cast Air Corps components also investment cast by the same company in order to obtain closest accuracy on difficult contours.

←

LOCATING CASTINGS in fixtures for machining is one of the recurrent problems with sand castings. Slight shifts in the cores, variations from casting to casting, or surface irregularities due to the nature of the molding material, give the tool designer and production machinist difficult jobs. That was the major disadvantage of the sand casting formerly used for this surveying instrument component. Now, as a permanent mold casting in brass, the piece fits into machining fixtures easily, speeding the finishing and reducing the number of rejects. It weighs about nine ounces and is made by Pressco Casting & Mfg. Corp. The original sand casting can be seen at left.

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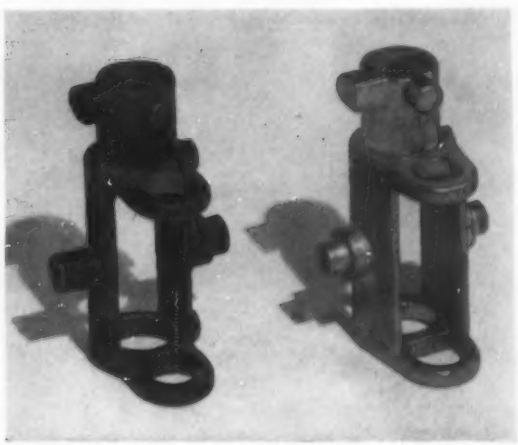

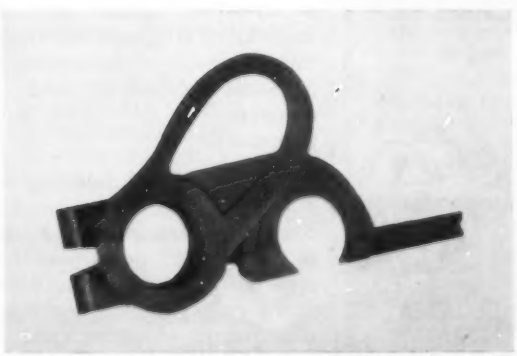

ORIGINALLY MADE by riveting together a stamping, a screw machine part and a machined lever, this business machine cam and lever unit was redesigned as a single investment casting. The casting, produced by Jelrus Precision Casting Corp. in 1045 steel, is stronger than the assembled unit and gives trouble-free service. The riveted assembly tended to work loose, resulting in faulty cam action.

←

SINTERING WITH GAS
continued from page 60

successive steps by direct contact as the operator pushes each fresh tray through the charge door. The charge vestibule holds two trays, the heating chamber four trays and the cooling zone four trays.

The interior of this muffle, from end to end, is kept constantly filled with a special prepared atmosphere to prevent any oxidadtion of the metal powder particles that would hinder uniform fusion and the formation of a solid mass. Although endothermic or "cracked" gas atmospheres can be employed for certain metals, AX atmosphere is ideal where a variety of conditions might be encountered.

This AX atmosphere is produced in Surface Combustion Corp., MAX generator that dissociates ammonia vapors at 1750F and delivers the resultant gas mixture (75% hydrogen, 25% nitrogen) directly to the furnace muffle. The generator operates automatically, after being brought to temperature and connected to the ammonia bottles. It continuously delivers gas at a rate of 150 cfh without any attention by the operator.

At the discharge end of the furnace, the trays are pulled out of the water jacketed zone, cool enough to handle, and ready for the next operation.

Sizing or coining, as it is sometimes called, is required in a four-ton press in order to strengthen the part and also to overcome the slight growth resulting from heating at near melting temperature. Good design of parts allows for this dimensional change.

The dies in the sizing press are almost duplicates of those in the briquetting press.

Oiling is extremely important as this operation imparts to each bushing the highly critical lubricating properties for for which it was produced. The parts are dumped into pans of special impregnating oil at 170F and kept for two or three hours. After draining for one hour they are ready for use.

Press fitting into the crank stands, arms, and other parts, is performed on oil-hydraulic presses on the production line.

The prime requirements of a sintering furnace are uniformity of temperature and atmosphere to produce constant physical properties and dimensions of the parts being processed.

Uniformity of heating and close control of atmosphere conditions are critical factors in the sintering of powdered metals. Since certain alloys powders expand on heating, it is a prime requisite that the

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furnace temperature be uniform at all times and production consistently duplicated. On the other hand, since a high proportion of the surface area of each part is contacted by the furnace atmosphere these gases must be completely free of oxidizing materials if the metal powders are to sinter properly and the maximum strength gained from each part.

Efficient automatic proportioning burners, firing over and under the heat resistant alloy muffle, operate on high-low temperature control, through a potentiometer type controller-recorder. By this means, highly uniform temperatures are maintained throughout the effective heating length of the muffle. These one-valve control burners operate on line pressure natural gas and combustion air from a turbo compressor type blower. Through the use of a venturi

continued next page

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type inspirator on the air line and a zero governor on the gas line a wide range of turndown is available by controlling the air valve only. This arrangement provides a temperature range from 1500 to 2100F which is adequate for practically all of the alloys commonly sintered.

The heat resistant alloy muffle is 12 inches wide and 36 inches long, and the complete furnace assembly occupies a floor space 13′ 6″ long 4′ 6″ wide, and is 5′ 9″ high.

Annealing of machined steel and brass parts is being carried out in this furnace whenever production time is available. Steel parts are annealed at 1700F and brass parts at 1300F. A five-minute push cycle is employed for both using the same AX atmosphere for sintering. These parts are annealed to soften them, after shaping in an automatic screw machine, for subsequent forming operations.

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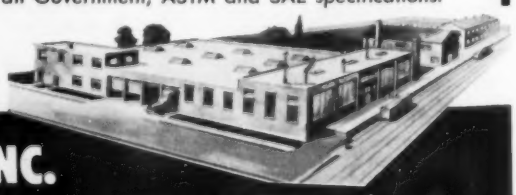

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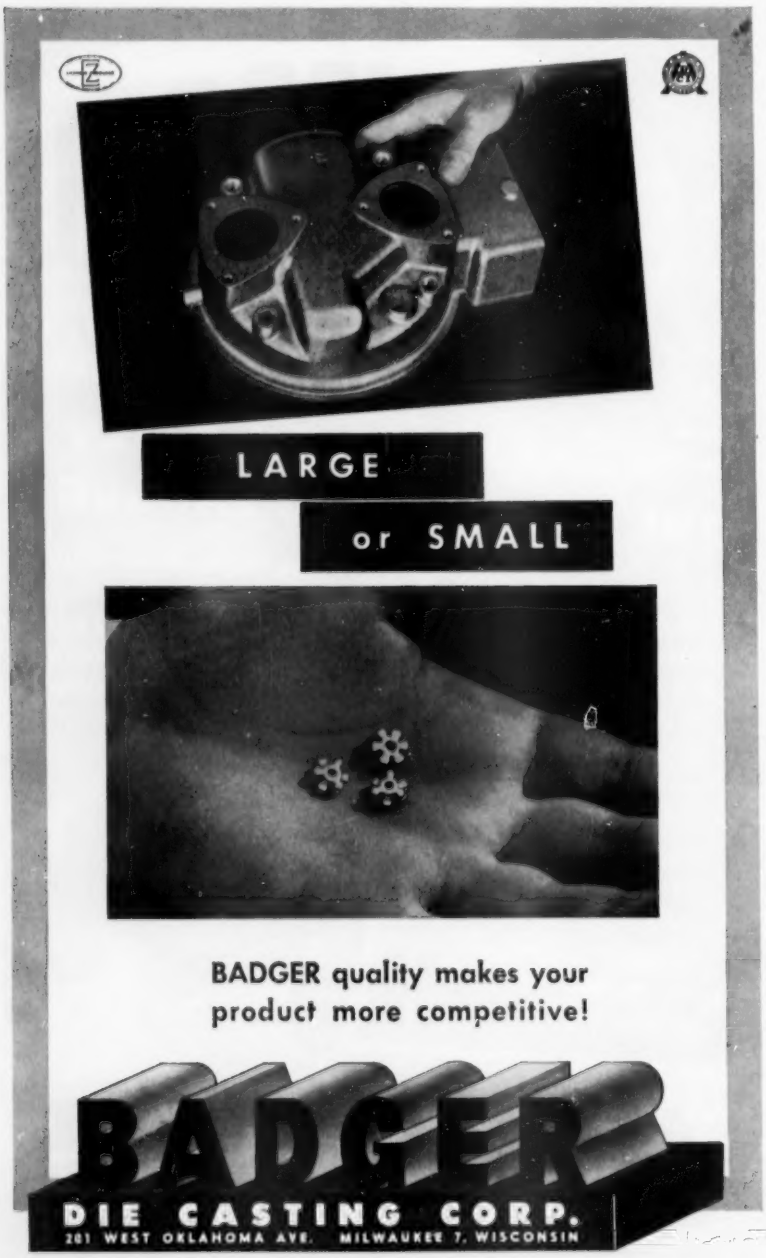

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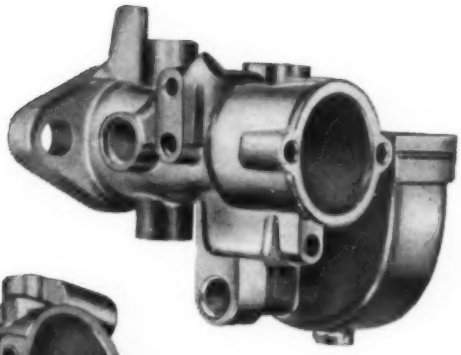

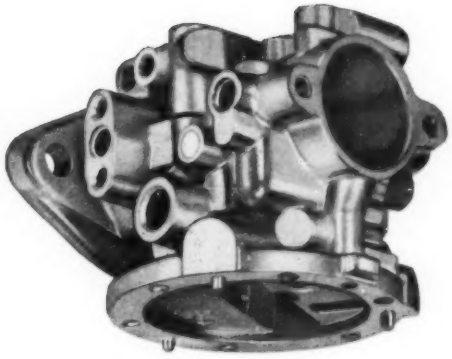

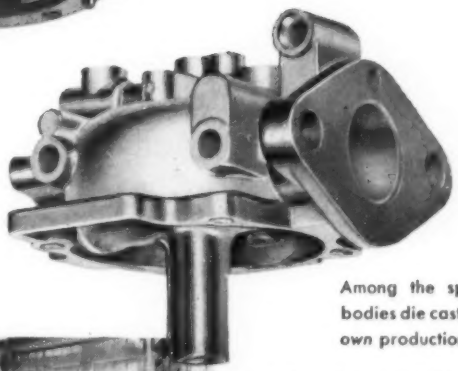

These complex die castings, produced by Hoover for the makers of the famous Tillotson Carburetors, are notable for their intricate coring and many close tolerances. They contain holes on all sides which must be perfectly aligned, and sections of the castings must be free from porosity to prevent leakage.

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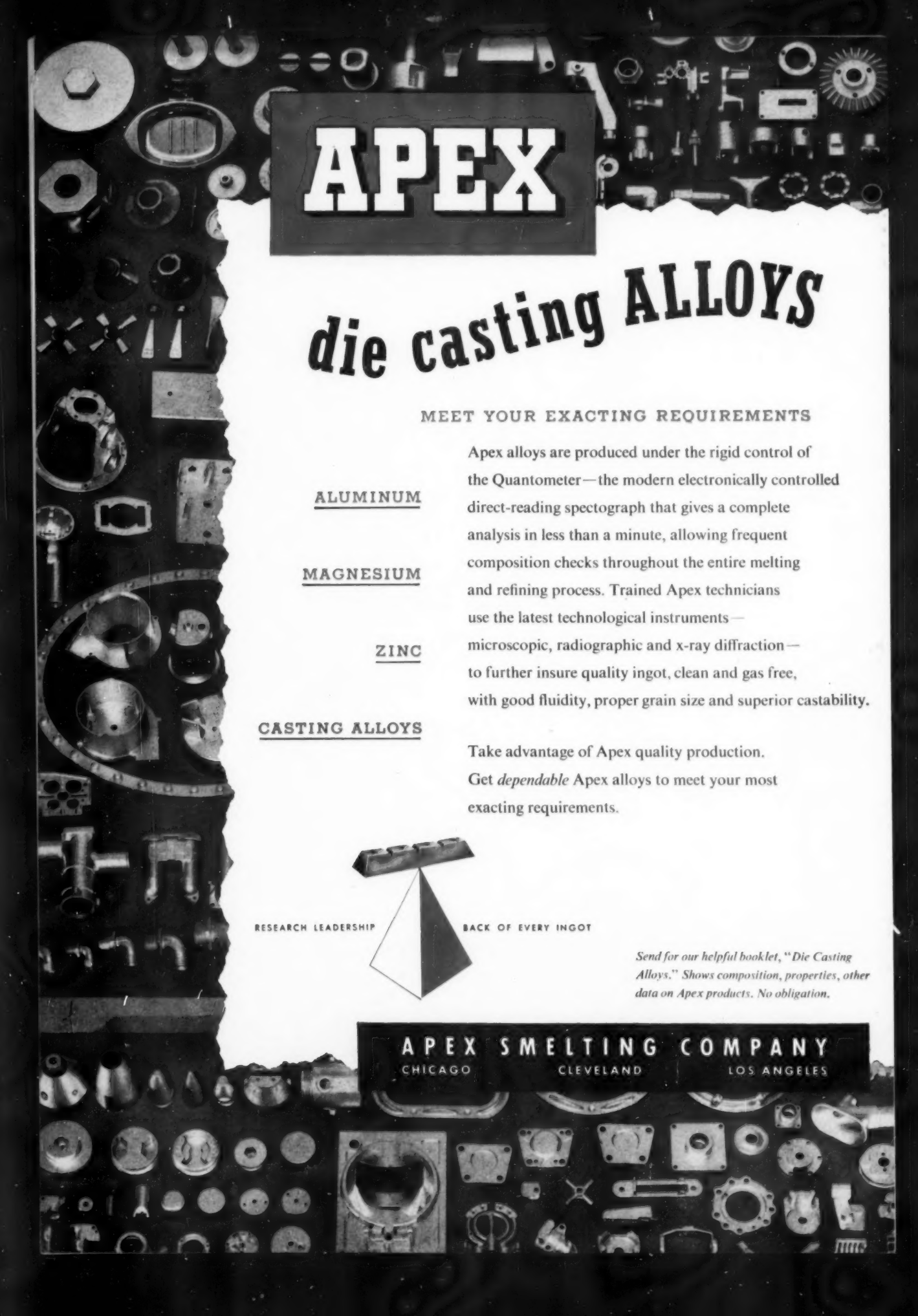
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